

**LEGAL
METROLOGY**
in OIML Member States

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January 1996

FOREWORD

This directory aims at presenting information concerning national metrological laws and regulations and their implementation in OIML Member States. National standards laboratories, calibration systems, and accreditation and certification activities related to metrology are also covered, where applicable.

The information is generally provided under the following headlines:

- 1 Laws of metrology
- 2 Legal units of measurement
- 3 Instruments subject to legal control
- 4 Metrological control of quantities
- 5 Services responsible for metrology
 - 5.1 National service of legal metrology
 - 5.2 Local verification services
 - 5.3 Laboratories responsible for maintaining national measurement standards
 - 5.4 Instrument calibration and evaluation systems
- 6 Accreditation and certification systems
 - 6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards
 - 6.2 Legal and applied metrological activities in product certification
 - 6.3 Legal and applied metrological activities in ISO 9000 quality management systems

For Member States not having provided updated reports at the time of publication, information has been taken from the 1990 edition of the directory.

This directory is also supplemented by a list of other metrology directories developed by and available from a number of regional organizations (*see contents*).

We hope that this directory will be useful in developing cooperation and strengthening communications between national, regional and international organizations engaged in legal metrology and related areas of metrology, testing and conformity assessment. Manufacturers and users of measuring instruments, consumer protection bodies, and other organizations connected with metrology services may also benefit from the information in this publication.

The BIML would like to thank all persons from Member States having provided the necessary information for this directory.

CONTENTS

<i>Member State</i>	<i>page</i>	<i>Member State</i>	<i>page</i>
ALGERIA	5	KAZAKHSTAN	77
AUSTRALIA	7	KENYA	79
AUSTRIA	11	D. P. REP. OF KOREA	81
BELARUS	13	REPUBLIC OF KOREA	83
BELGIUM	15	MONACO	87
BRAZIL	19	MOROCCO	89
BULGARIA	21	NETHERLANDS	91
CAMEROON	23	NORWAY	95
CANADA	25	PAKISTAN	97
P. REP. OF CHINA	29	POLAND	99
CUBA	33	PORTUGAL	101
CYPRUS	35	ROMANIA	105
CZECH REPUBLIC	37	RUSSIAN FEDERATION	107
DENMARK	39	SAUDI ARABIA	111
EGYPT	41	SLOVAKIA	113
ETHIOPIA	43	SLOVENIA	117
FINLAND	45	SPAIN	119
FRANCE	49	SRI LANKA	121
GERMANY	53	SWEDEN	123
GREECE	57	SWITZERLAND	125
HUNGARY	59	TANZANIA	127
INDIA	61	THE F. Y. R. OF MACEDONIA	129
INDONESIA	63	TUNISIA	133
IRELAND	65	UNITED KINGDOM	137
ISRAEL	67	UNITED STATES OF AMERICA	141
ITALY	69	YUGOSLAVIA	145
JAPAN	71	ZAMBIA	147
Other directories on Metrology			149

1 Laws of metrology

Law No. 90-18 of 31 July 1990 concerning the national system of legal metrology.

2 Legal units of measurement

The legal units used in Algeria are those of the International System of Units (Decree No. 91-587 of 25 December 1991 on the national measurement system).

3 Instruments subject to legal control

Measuring instruments subject to legal control according to Clause 8 of law No. 90-18 of 31 July 1990 are those that directly or indirectly facilitate the realization of commercial transactions.

With reference to clause 7 of the above law, Decree No. 91-538 of 25 December 1991 relates to control and verification of measuring instruments.

Various forms of control (initial and periodic verification and supervision) are performed by engineers, senior technicians, technicians and junior technicians in metrology.

Legal provisions and regulations have been completed with decrees establishing metrological and technical requirements on measuring instruments subject to legal control:

- measures of mass (Decree of 15 June 1992 fixing conditions of manufacturing measures of mass),
- weighing instruments (Decree of 15 June 1992 establishing provisions applicable to weighing instruments),
- taximeters (Decree of 15 June 1992 establishing provisions for counters of time and distance),
- measuring assemblies (Decree of 15 June 1992 fixing provisions for measuring assemblies for liquids other than water),
- gas meters (Decree of 15 June 1992 fixing provisions for gas meters),
- cold-water meters (Decree of 15 June 1992 establishing provisions for cold-water meters),
- tankers (Decree of 15 June 1995 fixing provisions for petrol transportation tankers),
- electric energy meters (Decree of 15 June 1992 fixing provisions for electrical energy meters),
- repair and installation staff (Decree of 15 June 1992 fixing conditions of approval for persons responsible for repairing and installing measuring instruments),
- approval and custody of patterns (Decree of 15 June 1992 related to conditions of approval and custody of patterns of measuring instruments).

In addition to operational decrees, there are four draft decrees in preparation concerning the following measuring instruments:

- measures of length,
- length measuring instruments,
- level gauges,
- storage tanks for petrol.

In addition to verification of measuring instruments, officers of the National Office of Legal Metrology (ONML) conduct calibration and recalibration of storage tanks for liquids including those for products under pressure.

4 Metrological control of quantities

The responsible staff perform within their prerogatives and according to the law relevant supervision for control of prepackaged products as to:

Decree No. 91-539 of 25 December 1991 establishing the categories of authorized officers and agents to inspect infractions of the law on the national system of legal metrology.

5 Services responsible for metrology

5.1 National service of legal metrology

The legal metrology activity in Algeria is the responsibility of the National Office of Legal Metrology created by Decree No. 86-250 of 30 September 1986.

Office National de Métrologie Légale (ONML)
1, rue Kaddour Rahim
16040 Hussein Dey
ALGER

Telephone: 213-2-77 77 37
213-2-77 90 57
Telex: 65 599

5.2 Local verification services

Pending the outcome of documents on reorganization of the Office, its present organizational scheme is as follows :

- One Director reporting to the Secretary General,
- Three departments (one administrative and two technical),
- Four regional branches (East, West, South and Center),
- Thirty sections in various localities.

The new organization will extend its field of activities to meet the required calibration needs.

This organization will comprise, by the year 2000, the following:

- Director,
- Four departments including three technical specialized ones,
- One calibration laboratory (mass, volume, force and length),
- Four regional divisions,
- Forty-eight local services,
- Division for processing information related to administrative and technical matters.

5.3 Laboratories responsible for maintaining national measurement standards

No information received.

5.4 Instrument calibration and evaluation systems

No information received.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

The principal law concerning legal metrology is the Commonwealth National Measurement Act 1960. The Act and its Regulations specify Australian legal units of measurement of physical quantities, and require that measurements made for any legal purpose are traceable to Australian primary standards. The Act also provides for the pattern approval of trade measurement instruments.

Uniform Trade Measurement Legislation is being enacted in all states and territories. The verification and re-verification of measuring instruments in use for trade is controlled under this legislation and provision is made for certification (i.e. verification) by licensed private organizations as well as the control of prepackaged articles.

2 Legal units of measurement

The legal units of measurement within Australia are those of the International System of Units (SI). Conversion to the SI began in 1972 and is now considered to be complete.

3 Instruments subject to legal control

Measuring instruments, intended for trade use and covered by the Uniform Trade Measurement Legislation, must be covered by a certificate of approval issued by the National Standards Commission.

Some measuring instruments such as electricity, gas, water and taximeters are subject to regulation by agencies other than federal or state Weights and Measures authorities.

4 Metrological control of quantities

This area of weights and measures supervision is controlled by state and territory authorities under the Uniform Trade Measurement Legislation.

5 Services responsible for metrology

5.1 National service of legal metrology

The Commonwealth authority for legal metrology is:

National Standards Commission (NSC)
PO Box 282
NORTH RYDE
NSW 2113

Telephone: 61-2-888 3922
Fax: 61-2-888 3033

The National Measurement Laboratory is responsible for the calibration of the physical reference standards used in the States and Territories (see Section 5.3).

The National Standards Commission (NSC) has responsibility for advising the Commonwealth Government on the scientific, technical and legislative requirements of the Australian National Measurement System and has specific responsibilities for coordinating the National Measurement System, for legal metrology, for trade measurement and for metrication.

The NSC provides the chairperson and secretariat for the Standing Committee on Trade Measurement, and is responsible for uniformity of administration of trade measurement (including packaging by measure). The NSC examines and, upon conformity, approves the pattern of measuring instruments as suitable for use in trade.

The NSC publishes a series of Design Manuals for the guidance of manufacturers and importers of measuring instruments that are required to be pattern approved, and is the organization directly responsible for OIML activities in Australia. The Executive Director of the NSC is the Australian representative to the CIML.

5.2 Local verification services

Each state and territory has independent regulatory bodies in the field of weights and measures, usually within the organization of State Departments of Consumer Affairs. Inspectors from these Departments inspect and verify instruments for use in trade.

Under the Uniform Trade Measurement Legislation, licensed certifying agencies will perform certifications of instruments for use in trade.

5.3 Laboratories responsible for maintaining national measurement standards

For all physical quantities:

CSIRO Division of Applied Physics
National Measurement Laboratory (NML)
PO Box 218
LINDFIELD
NSW 2070

Telephone: 61-2-413 7211
Fax: 61-2-416 7902

The NML produces a number of publications on particular aspects of physical quantities but the main publication describing the primary standards maintained by the NML is *The Australian Standards for the Measurement of Physical Quantities*. The NML provides Australian representation on the CGPM, the CIPM and its consultative committees.

5.4 Instrument calibration and evaluation systems

The National Standards Commission maintains a testing and calibration laboratory for pattern approval testing of trade measurement instruments.

The National Association of Testing Authorities (NATA), accredits laboratories in industry, educational institutions, semi-government organizations and other administrative bodies, and undertakes testing procedures for which officially recognized certificates are issued. NATA represents Australia at the International Laboratory Accreditation Conference and has mutual recognition agreements with a number of national laboratory accreditation organizations.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories – Traceability to national, regional, international or foreign measurement standards

There are two principal methods of disseminating standards of measurement which are traceable to the Australian primary standards. The first method is through the National Association of Testing Authorities (NATA) which is concerned primarily with measurements of a scientific or technical nature; and the second method is through the appointment of Verifying Authorities, by the National Standards Commission (NSC) under Regulation 77 of the National Measurement Act 1960. Verifying Authorities are appointed for trade measurements, surveying and utility measurements (electricity, telephone, etc).

Since the legal requirements vary depending on the accuracy required, a hierarchy of standards has been developed which enables a range of accuracies to be disseminated throughout the community.

Australian primary standards of measurement for each of the legally defined units are maintained by the Commonwealth Scientific and Industrial Research Organization (CSIRO) National Measurement Laboratory (or its agents).

Second-level standards are maintained by the state and territories Weights and Measures authorities and NATA-registered laboratories. NATA accreditation of laboratories ensures that calibration, staff and processes meet criteria necessary to ensure traceability.

The National Standards Commission may approve the pattern of measuring instruments used for legal purposes, including trade use.

6.2 Legal and applied metrological activities in product certification

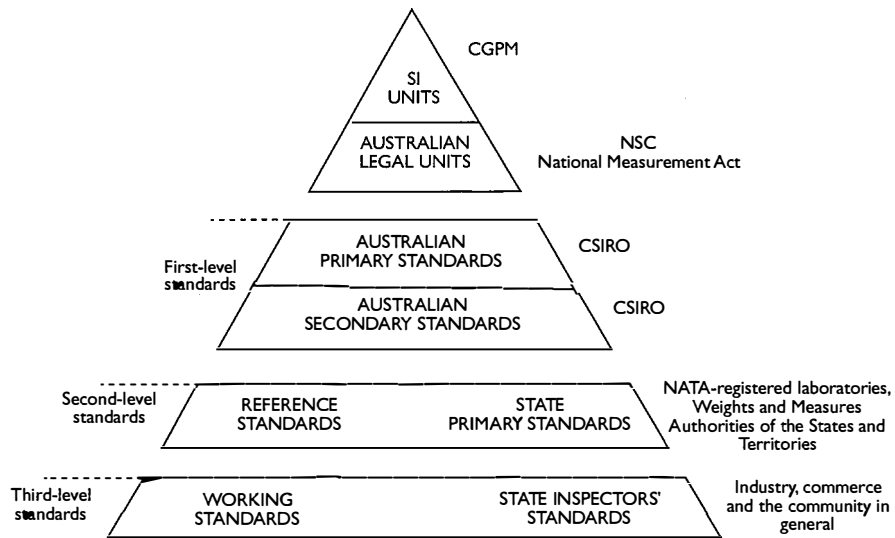
Products certification is provided by Standards Australia Quality Assurance Services Pty Ltd which is a wholly owned subsidiary of Standards Australia. Only when a product or quality system has been certified to internationally recognized standards and passes the regular audits is an organization licensed to use the StandardsMark on its products.

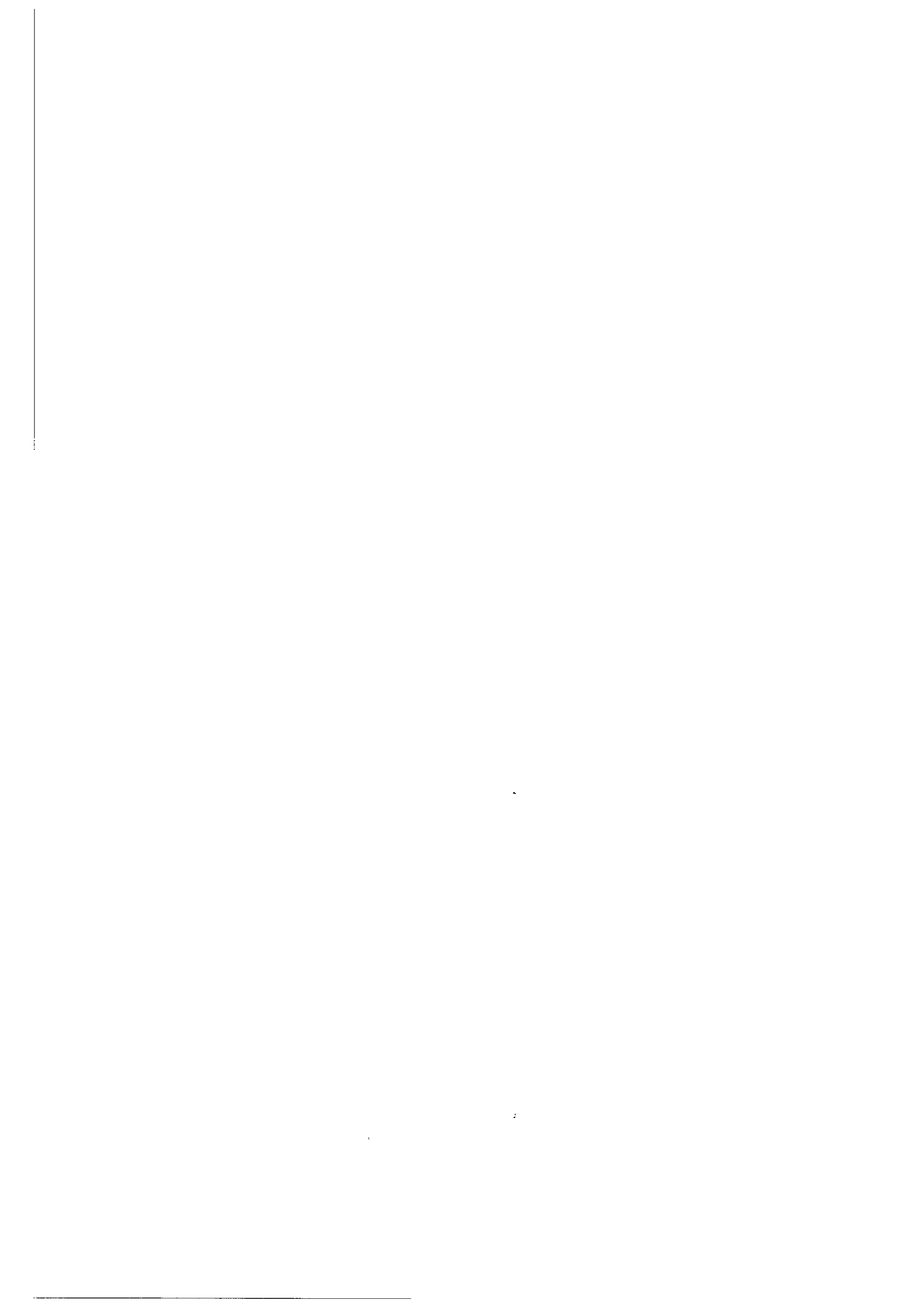
6.3 Legal and applied metrological activities in ISO 9000 quality management systems

Australia has adopted the ISO 9000 series of standards in their entirety as the national quality standards. The series was published in Australia in 1987 as the AS 3900/ISO 9000, and given dual numbering to emphasize the ISO connection.

Quality certification to ISO 9000 is provided by private organizations that are accredited by the Joint Accreditation Scheme for Australia and New Zealand (JASANZ). There are currently eleven organizations accredited under this scheme.

Australia's hierarchy of physical units and standards is shown hereafter.





1 Laws of metrology

1.1 In Austria legal metrology is subject to federal administration.

The principal law is the Maß- und Eichgesetz (MEG), Bundesgesetzblatt No. 152/1950 in der Fassung der Kundmachung, Bundesgesetzblatt No. 779/1992 (Law on Legal Metrology, MEG, Bulletin of Federal Legislation No. 152/1950 in the version of the federal law Bulletin of Federal Legislation No. 779/1992), which not only establishes the form of organization and the activities of the legal metrology authorities but also the legal units of measurement to be employed in official and public transactions.

1.2 In addition the following federal law is valid:

Zeitählungsgesetz (Legal time counting), BGBl. No. 78/1976 in the version of the federal law Bulletin of Federal Legislation No. 52/1981.

1.3 The following regulations have been issued as Ministerial Decrees:

- Eichämterverordnung (Location and Competences of Verification Offices) BGBl. No. 320/1990 in the version of the ordinance of the federal law Bulletin of Federal Legislation No. 373/1994,
- Eich-Zulassungsordnung (Execution of Pattern Approval) BGBl. No. 785/1992,
- Schankgefäßverordnung (Drinking Glassware) BGBl. No. 742/1988
- Fertigpackungsverordnung (Prepackaged Goods) BGBl. No. 867/1993.

1.4 The following international treaties are valid:

- Internationale Meter-Convention vom 20 May 1875 (Convention du Mètre), BGBl. No. 1876/20,
- Convention instituant une Organisation Internationale de Métrologie Légale (OIML Convention), BGBl. No. 171/1958,
- Agreement between Austria and the Federal Republic of Germany on testing and stamping of measuring instruments, BGBl. No. 289/1967.

1.5 All regulations for verification of the various measuring instruments are issued by the Bundesamt für Eich- und Vermessungswesen in the *Amtsblatt für das Eichwesen* (Bulletin of the Metrological Service).

1.6 Main reference:

Österreichisches Maß- und Eichrecht, H.W. Kaluza, Ch. Twaroch, Prugg Verlag Eisenstadt, Eisenstadt 1993.

2 Legal units of measurement

Measurement units as stated in the Law on Legal Metrology, mainly those of the International System of Units (SI) (see Section 1.1).

3 Instruments subject to legal control

3.1 The following instruments are subject to individual verification if they are used in official or commercial transactions, in the health service, in environmental protection, for road measurements, and for ensuring security.

Measuring instruments for length, area, volume, velocity, acceleration, mass, density, temperature, viscosity, as well as taximeters, measuring instruments for the examination of cereal grains, of milk or milk products, measuring instruments used in alcoholometry, flash-point testers, refractometers, watt-hour meters, instrument transformers, water meters, sound pressure level meters and test sound generators, diamond indenters for hardness testing machines and standardized hardness test blocks, pressure measuring instruments, gas meters, heat meters, breath testers, measuring instruments for the activity of radionuclids, dosimeters for photon-radiation.

3.2 Graduated medical syringes and some types of dosimeters are subject to technical control by the Metrological Service: this is a sample test and not a verification.

3.3 Drinking glassware, bottles and prepackaged goods are not subject to verification, their production is supervised by the Metrological Service.

4 Metrological control of quantities

This comes within the competence of the Metrological Service.

5 Services responsible for metrology

5.1 National service of legal metrology

Bundesamt für Eich- und Vermessungswesen (BEV)
Arltgasse 35, A-1163 WIEN

Telephone: 43-1-49 1101
Fax: 43-1-49 20 875

The Bundesamt für Eich- und Vermessungswesen (BEV) comes under the competence of the Federal Ministry of Economic Affairs. The Austrian Metrological Service has a staff of 291 members (local verification offices included); it is a branch of the BEV.

5.2 Local verification services

Austria is divided into three Regional Inspection Districts for which verification offices are located in the following cities:

- 1) Wien, Eisenstadt, Krems/Donau, Baden, St. Pölten,
- 2) Linz, Gmunden, Innsbruck, Salzburg, Bregenz,
- 3) Graz, Leoben, Klagenfurt.

5.3 Laboratories responsible for maintaining national measurement standards

The national measurement standards are maintained by the Bundesamt für Eich- und Vermessungswesen (BEV) (see Section 5.1).

5.4 Instrument calibration and evaluation systems

Though a Calibration Service had been established by the Society for Measuring and Automation Techniques of the ÖVE-ÖIAV, an official Calibration Service has been introduced by law. Thus the accreditation of calibration laboratories is effected by the Ministry of Economic Affairs. The BEV is responsible for technical supervision.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The accreditation systems for legal metrology as well as calibration and testing laboratories are subject to the Ministry of Economic Affairs. Traceability is the responsibility of the BEV.

6.2 Legal and applied metrological activities in product certification

The Ministry of Economic Affairs authorizes private bodies to certify products.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

The Ministry of Economic Affairs authorizes private bodies to certify ISO 9000 quality management systems.

1 Laws of metrology

- Belarus Council of Ministers' Decree of 30 May 1993 No. 172 on the Assurance of Uniformity of Measurements,
- Regulations on State Inspection of Standards and Measuring Instruments in Belarus, adopted by Belarus Council of Ministers' Decree of 2 June 1993 No. 360,
- The Committee for Standardization, Metrology and Certification of Belarus (BELSTANDART). Regulation adopted by Belarus Council of Ministers' Decree of 13 July 1994 No. 521.

The laws currently in force are currently being revised.

2 Legal units of measurement

The legal units of measurement within Belarus are those of the International System of Units (SI).

3 Instruments subject to legal control

The following instruments are subject to state legal control:

instruments used for trade, health protection, industrial production, construction, transport, agriculture, metrology, communication and municipal economy, for the following purposes:

- commerce, customs, post and tax procedures,
- diagnosis and treatment of human diseases,
- control over medicines,
- environmental control,
- control of labour safety,
- storage, transportation and utilization of toxic, flammable, explosive and radioactive substances,
- control of product safety and quality, especially foodstuff products,
- test, verification and calibration of measuring instruments.

BELSTANDART confirms the list of measuring instruments subject to legal verification through its regional and territorial bodies.

4 Metrological control of quantities

Metrological control of prepackaged products is conducted by BELSTANDART institutions and inspectors during state inspections of the observance of standards and metrological regulations. Seals and weights used for prepackaging are subject to state verification and tests.

5 Services responsible for metrology

5.1 National service of legal metrology

The organization which is responsible for legal metrology is:

The Committee for Standardization, Metrology and Certification of Belarus (BELSTANDART)

93, Starovilenski tract

MINSK 220114

Telephone: 375-172-37 52 13

Fax: 375-172-37 25 88

State metrological surveillance is carried out in fields of activity such as:

- environmental protection,
- safety assurance,
- human diseases diagnosis and treatment,
- drugs control,
- animal diseases diagnosis and treatment,
- storage, second processing, transportation, burial and annihilation of toxic, inflammable, explosive and radioactive substances,
- commercial operations, mutual settlements between supplier and customer (between buyer and seller),
- dissemination of physical unit values from standards to working measuring instruments,
- measuring instrument production,
- state settlement operations,
- assurance of state defence,

- geodetic and hydrometeorological work,
- banking, tax, customs and postal operations, manufacturing of products, delivered on contracts for state needs,
- testing and quality control to ascertain product conformity with obligatory requirements of standards,
- obligatory certification of products and services,
- measurements performed on assignment of courts of justice, public prosecutor's office, court of arbitration, state authorities,
- registration of national and international sporting records,
- sales of measuring instruments.

The BELSTANDART system includes:

- the centre of national standards of physical units (Minsk Centre of Standardization and Metrology),
- regional centres of standardization and metrology (fifteen units).

5.2 Local verification services

Regional and local state verification services are subdivisions of BELSTANDART territorial centres.

5.3 Laboratories responsible for maintaining national measurement standards

The Minsk Centre for Standardization and Metrology has custody of national measurement standards.

Minsk Centre for Standardization and Metrology
93, Starovilenski tract
MINSK 220114

Telephone: 375-172-37 55 01
375-172-37 14 33
Fax: 375-172-37 25 88

5.4 Instrument calibration and evaluation systems

Calibration, certification and control of measuring instruments which are not subject to state verification are performed by accredited metrological services of enterprises, organizations and amalgamations.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The national system of accreditation of calibration and test laboratories is regulated by the following standards:

- STB 941.0-93, System of accreditation of verification and testing laboratory of Belarus. Main principles
- STB 941.1-93, System of accreditation of verification and testing laboratory of Belarus. General requirements for board of accreditation of verification and testing laboratory
- STB 941.2-93, System of accreditation of verification and testing laboratory of Belarus. General requirements for accreditation of verification and testing laboratory
- STB 941.3-93, System of accreditation of verification and testing laboratory of Belarus. General requirements for estimation of technical competence of verification and testing laboratory.

6.2 Legal and applied metrological activities in product certification

These include:

- certification of measuring instrument safety and metrological quality,
- accreditation of test laboratories which execute certification tests,
- verification and calibration of measuring instruments and estimation of technical characteristics of test equipment used for certification of products.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

The legal metrology service helps industry to elaborate and introduce quality systems on the basis of ISO 9000 standards. Departmental metrology services take part in elaboration of standards of enterprises which regulate quality control and participate in their fulfilment.

1 Laws of metrology

At present, Belgian metrology is essentially ruled by the law of 16 June 1970 on measurement units, standards and measuring instruments, modified by the law of 21 February 1986 and by dependent regulations.

For some rare groups of measuring instruments which are not yet regulated on the basis of the law of 16 June 1970, the old regulations are still applied.

2 Legal units of measurement

The law of 16 June 1970 determines the basic units within the International System of Units (SI).

In accordance with the SI, the Royal Decree of 14 September 1970, amended by the Royal Decrees of 4 October 1977, 23 January 1981 and 4 February 1986, fixes the legal units of measurement, their multiples and sub-multiples, and for the units which are not part of the SI, it fixes possible limitations on their use either over time or in their field of application.

3 Instruments subject to legal control

The law of 16 June 1970 specifies that:

- measurements in the economic circuit intended to fix the quantity of goods or the extent of services must be carried out with verified measuring instruments,
- measurements intended for the calculation of taxes and restitutions shall be carried out with verified measuring instruments,
- the King may extend the application to other measurements in the economic circuit (e.g. measurements intended to determine the measurable qualities of supplied goods),
- the King may impose the use of verified measuring instruments for measurements outside the economic circuit (e.g. measurements intended to guarantee public health and security).

On 1 January 1994 the following groups of instruments were regulated:

- volumetric measures,
- clinical thermometers,
- instruments for milk analysis: glass butyrometers for undiluted milk and for cream, milk pipettes, cream pipettes, sulphuric acid pipettes, amyl alcohol pipettes, automatic dispensers and pipetting apparatus,
- taximeters,
- laboratory volumetric glass flasks,
- tachographs,
- gas meters,
- instruments for measuring the hectolitre mass of cereals,
- weights of 1 milligram through 50 kilograms,
- nonautomatic weighing instruments,
- ship tanks,
- cold-water meters,
- continuous totalizing weighing machines,
- alcoholometers and alcohol hydrometers,
- measuring assemblies for liquids other than water,
- material measures of length,
- hot-water meters,
- electrical energy meters,
- check weighers,
- tyre pressure gauges for motor vehicles,
- breath testers,
- fixed storage tanks.

4 Metrological control of quantities

Prepackaging is ruled by the Royal Decree of 28 December 1979 concerning the preconditioning by mass or by volume of certain prepackaged products as well as by the subsequent regulations. The European Community requirements are adopted in this Royal Decree which was issued in pursuance of the law of 14 July 1971 on the practice of commerce.

Metrological control of prepackages is carried out by the General Inspection of Metrology.

Quantity control of products, prepackaged or not, is also carried out by the Economic General Inspection, another department of the Ministry of Economic Affairs.

5 Services responsible for metrology

The sole service responsible for metrology is the General Inspection of Metrology, which has a total staff of 140 covering the whole country (scientific, technical, manual and administrative staff).

5.1 National service of legal metrology

The General Inspection of Metrology has at its disposal two central services in Brussels. The first, the main office, is:

Inspection Générale de la Métrologie (IGM)
NG III, Bld E. Jacquain 154
B-1210 BRUSSELS

Telephone: 32-2-206 47 35
Fax: 32-2-206 57 45

The second, essentially containing large measurement installations, is situated at:

1795 Chaussée d'Haecht
B-1130 BRUSSELS

Telephone: 32-2-215 48 79
Fax: 32-2-245 76 73

The central services are mainly engaged in:

- pattern approvals,
- some compulsory initial verifications,
- calibration of measuring instruments used in industry and science.

5.2 Local verification services

The General Inspection of Metrology comprises five regional services (five metrological circumscriptions) with fifteen permanent verification offices.

The regional services are entrusted with the initial verification, the periodic verification and the technical control of most of the measuring instruments used in the economic circuit. These verifications are carried out either in permanent or temporary verification offices, or at the manufacturers, importers or repairers, or *in situ*.

5.3 Laboratories responsible for maintaining national measurement standards

The Calibration Service of the General Inspection of Metrology is in charge of the determination of legal units, of the realization and maintenance of national standards and of the execution of calibrations for external customers. This Service assures traceability to international standards and dissemination of legal units to the scientific and industrial fields.

To date the laboratories of the General Inspection of Metrology are the only ones in charge of national standards.

5.4 Instrument calibration and evaluation systems

No information received.

6 Accreditation and certification systems

Based on the law of 20 July 1990 dealing with the accreditation of certification and inspection bodies and testing laboratories, the Belgian accreditation structure is the responsibility of the Minister of Economic Affairs.

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The General Inspection of Metrology provides the secretariat of the Belgian Calibration Organization (OBE) created by Royal Decree of 28 November 1986 in execution of the law of 16 June 1970 on measurement units, standards and measuring instruments. This accreditation structure, parallel to the BELTEST and BELCERT systems (see below) ensures overall coherence.

The legal accreditation system for testing laboratories and inspection bodies is called BELTEST.

The criteria of competence required from the accredited laboratories are those of the EN-45001 standard, of ISO/CEI Guide 25 and of the relevant parts of the ISO 9002 standard.

The OBE and BELTEST systems are coordinated at the level of their accreditation commissions. By mid-1994 about twenty laboratories had been accredited.

6.2 Legal and applied metrological activities in product certification

BELCERT is responsible for the accreditation of bodies performing certification of products, quality systems and persons.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

The Calibration Service of the General Inspection of Metrology provides representatives and specialists in the various commissions to ensure coherence in respect of the metrological requirements to be applied by the accredited bodies.

1 Laws of metrology

- Law No. 5966 of 11 December 1973 instituted the National System for Metrology, Standardization and Industrial Quality to formulate and carry out the national policy for metrology, standardization and certification of the quality of industrial products.
- Decree - Law No. 10 of 16 January 1991 regulated the National Institute for Metrology, Standardization and Industrial Quality (INMETRO) as responsible for carrying out the national policy for legal, scientific and industrial metrology, and the certification of the quality of industrial products.
- Resolution CONMETRO No. 11 of 12 October 1988 established INMETRO as the central and executive body, responsible for recommending and promulgating the complementary normative acts required for the development of metrological works, and specifying minimal conditions to be satisfied by models of measurement instruments.
- Resolution CONMETRO No. 12 of 12 October 1988 adopted the International System of Units (SI), and laid down the rules for derived and supplementary units and other matters to establish a comprehensive specification for units of measurement.

2 Legal units of measurement

The legal units of measurement are those of the International System of Units completed by the units used together with this system and admitted temporarily under the conditions stated in Resolution CONMETRO No. 12 of 12 October 1988.

3 Instruments subject to legal control

Resolution CONMETRO No. 11 of 12 October 1988 states that measuring instruments are subject to legal control when they are used in trade, presented for sale, or when they are used for some particular measurements of interest to individuals. A few types of instrument are regulated by directives issued by INMETRO. The following categories of measuring instrument are subject to regulations as at 1 October 1994:

- weights and nonautomatic weighing instruments,
- length measures,
- taximeters,
- rail and road transport tanks, storage tanks,
- volume measures,
- thermometers for alcohol and petroleum products,
- hydrometers for alcohol and petroleum products,
- domestic electrical energy meters and cold-water meters,
- clinical thermometers,
- fuel dispensers for motor vehicles.

4 Metrological control of quantities

The metrological requirements for prepackaged goods are in accordance with Resolution CONMETRO No. 11 of 12 October 1988.

5 Services responsible for metrology

The National System of Metrology, Standardization and Industrial Quality, SINMETRO, established by Law No. 5966 of 11 December 1973 is composed of:

- a council for standardization policy: the National Council of Metrology, Standardization and Industrial Quality (CONMETRO),
- a central executive technical organ: the National Institute of Metrology, Standardization and Industrial Quality (INMETRO).

INMETRO comes under the auspices of the Ministry of Industry, Trade and Tourism, and its duty is to stimulate, control and coordinate national activities in the field of metrology and bring about consultation mechanisms for harmonizing public interest and that of enterprises and consumers.

INMETRO also aims to unify and apply the units of measurement and give the necessary guidance for this in the field of trade, industry, technology and science. It also establishes the minimum requirements for the patterns of measuring instruments and the approval of these instruments.

5.1 National service of legal metrology

The Directorate of Legal Metrology of INMETRO is responsible for guiding, coordinating and implementing legal metrology activities and comprises divisions for: pattern approval of measuring instruments, technical and metrological regulations for measuring instruments and material measures, prepackage control, gauging of storage tanks and technical assistance to the regional verification services.

Directorate of Legal Metrology
Avenida Nossa Senhora das Graças, No. 50 - Xerém -
25250-20 Duque de Caxias
RIO DE JANEIRO

Telephone: 55-21-679 1639
Fax: 55-21-679 1761

5.2 Local verification services

The National Network of Legal Metrology (RNML) is responsible for carrying out the legal metrology service. The structure is composed of sixteen organisms covering all the national territory: twenty-five centres are located in the capitals of Brazil's states and sixty-seven agencies are in the smaller cities. The total number of staff in the regional verification services amounts to about 2500.

5.3 Laboratories responsible for maintaining national measurement standards

The national standards representing the legal units are maintained by the laboratories of the Scientific and Industrial Metrology Directorship of INMETRO, by the National Observatory, and by the Institute for Radiation Protection and Dosimetry. These laboratories form the National Metrology Laboratory (LNM) as follows:

Laboratories of mechanics, electricity, temperature, acoustics, and optics:

Directorate of Scientific and Industrial Metrology of INMETRO
Avenida Nossa Senhora das Graças, No. 50 - Xerém
25250-020 Duque de Caxias
RIO DE JANEIRO

Telephone: 55-21-679 1311
Ext. 2011
Fax: 55-21-679 1420

Laboratory of time and frequency:

National Observatory
Time Service
Rua General Bruce, No. 586 - São Cristóvão
RIO DE JANEIRO

Telephone: 55-21-580 6137
Fax: 55-21-580 6071

Laboratory of ionizing radiation:

Nuclear Energy Commission
Institute of Radiation Protection and Dosimetry
Caixa Postal 37750
22642-970 RIO DE JANEIRO

Telephone: 55-21-442 9692
55-21-442 1605
Fax: 55-21-442 9675

5.4 Instrument calibration and evaluation systems

The Directorate of Scientific and Industrial Metrology has established the Brazilian Calibration Network (RBC) comprising fifty-five accredited and authorized laboratories which can deliver official certificates.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

- The law on units and measuring instruments was published in the *Official Journal* No. 289 of 9 December 1948 (with amendments in No. 308/1948 and No. 17/1949). It was modified and completed by the publications in *Izvestia* No. 13 of 13 February 1951, No. 104 of 28 December 1951, No. 14 of 15 February 1952 and in the *Official Journal* No. 102 of 1977, No. 36 of 8 May 1979, No. 102 of 29 December 1981, No. 85 of 1 November 1985 and No. 89 of 18 November 1986.
- The law on standardization published in the *Official Journal* No. 48 of 19 June 1964 was modified and completed in No. 81 of 13 October 1964, No. 48 of 20 June 1967, No. 92 of 28 November 1969, No. 47 of 16 April 1970, No. 74 of 26 September 1975, No. 102 of 29 December 1981, No. 85 of 1 November 1985 and No. 33 of 29 April 1988. This law regulates the establishment, application and control of the national standards (BDS) comprising the national system of ensuring uniformity of measurements.

2 Legal units of measurement

The use of the units of the International System of Units (SI) and their multiples is compulsory in all fields of science and in practical applications as well as in education. The legal units are specified in Article 1, Definition of legal units and their standards, of the law on units and measuring instruments and also in the written standards BDS ISO 31 and BDS ISO 1000. These standards comprise the base units, supplementary units, units outside the International System which are admitted for use, prefixes for multiples and derived units, rules for symbols and the establishment of coherent derived units.

3 Instruments subject to legal control

Instruments subject to legal control by means of testing and verification are those that are assigned and used in controlling valuable materials, in commercial transactions, in the health care, ensuring safety in public and technical spheres, in field of radiation and at work sites, in environmental protection, safety in communications and transportation, in national defence and security, in quality control of foodstuffs, in the registration of sporting records at national and international level, and for measurements, testing and certification in official or approved laboratories.

All working standards used for testing, verification, calibration and repair of measuring instruments are subject to calibration.

Other measuring instruments may be subject to testing and verification depending on the state and public requirements. Such measuring instruments are designated by order of the Committee for Standardization and Metrology.

4 Metrological control of quantities

Metrological control is carried out by the national metrology service and its local divisions on the basis of the law described in Section 1.

5 Services responsible for metrology

The services responsible for metrology are the national (state) service of metrology, industrial metrological services and approved laboratories (state or private).

5.1 National service of legal metrology

Committee for Standardization and Metrology
21, 6 September Street
SOFIA 1000

Telephone: 359-2-85 91
Fax: 359-2-80 14 02
Telex: 22570 DKS BG

The field of competence of the Committee covers:

- coordination, control and supervision of the metrological activities in the country,
- establishment of rules governing reproduction, maintenance, dissemination and use of the legal units of the country and that to ensure uniformity of measurement,
- establishment and development of the system of national standards for the units of measurement according to the needs of the country,

- development and automation of methods and means for transfer of units of measurement from the national standards to the measuring instruments used in practice,
- scientific research, tests and state certification of measuring instruments during their manufacture, importation or use,
- drafting and proposition of normative documents in the field of metrology,
- accreditation of laboratories for the verification of measuring instruments,
- metrological evaluation of calibration and testing laboratories for products and materials,
- participation in professional training of metrology staff,
- representation of the country and participation in international organizations and technical exchanges with foreign countries concerning metrology.

5.2 Local verification services

There are in Bulgaria fifteen local divisions of the national metrology service (regional centres of metrology) located in the bigger industrialized cities. These cover the corresponding regions of the country.

5.3 Laboratories responsible for maintaining national measurement standards

The national measurement standards are created, maintained and used at the National Metrology Centre and certain regional metrology centres.

5.4 Instrument calibration and evaluation systems

Calibration of measuring instruments is carried out by:

National Metrology Centre
52-B, G.M. Dimitrov Blvd.
SOFIA 1113

Telephone: 359-2-71 291
Fax: 359-2-71 66 21

6 Accreditation and certification systems

No information received.

1 Laws of metrology

The law No. 22 of 29 November 1983 concerning the metric system and the control of measuring instruments is the sole law on metrology and applies to the whole territory.

This law is accompanied by a set of eleven decrees of application that can be obtained from the Sub-division of Standardization and Weights and Measures, Division of Prices and Consumer Protection, of the Ministry of Economy and Finances.

2 Legal units of measurement

The only units admitted in all commercial transactions are those of the International System of Units (SI).

3 Instruments subject to legal control

Instruments for measuring mass, volume and length are subject to administrative control when used in commercial transactions or other fields for which accurate measurements should be guaranteed in public utilities.

4 Metrological control of quantities

The system of control of prepackaged products follows OIML International Recommendations on net content of prepackages.

5 Services responsible for metrology

5.1 National service of legal metrology

Direction des Prix et de la Protection du Consommateur
au Ministère de l'Economie et des Finances
BP 501
YAOUNDÉ

Telephone: 237-22 31 16
237-23 26 17
Fax: 237-22 35 69

5.2 Local verification services

The Cameroonian territory is divided into ten provinces and fifty-six departments distributed over these provinces.

In each province there is a Provincial Service and there are Brigades in the departments.

5.3 Laboratories responsible for maintaining national measurement standards

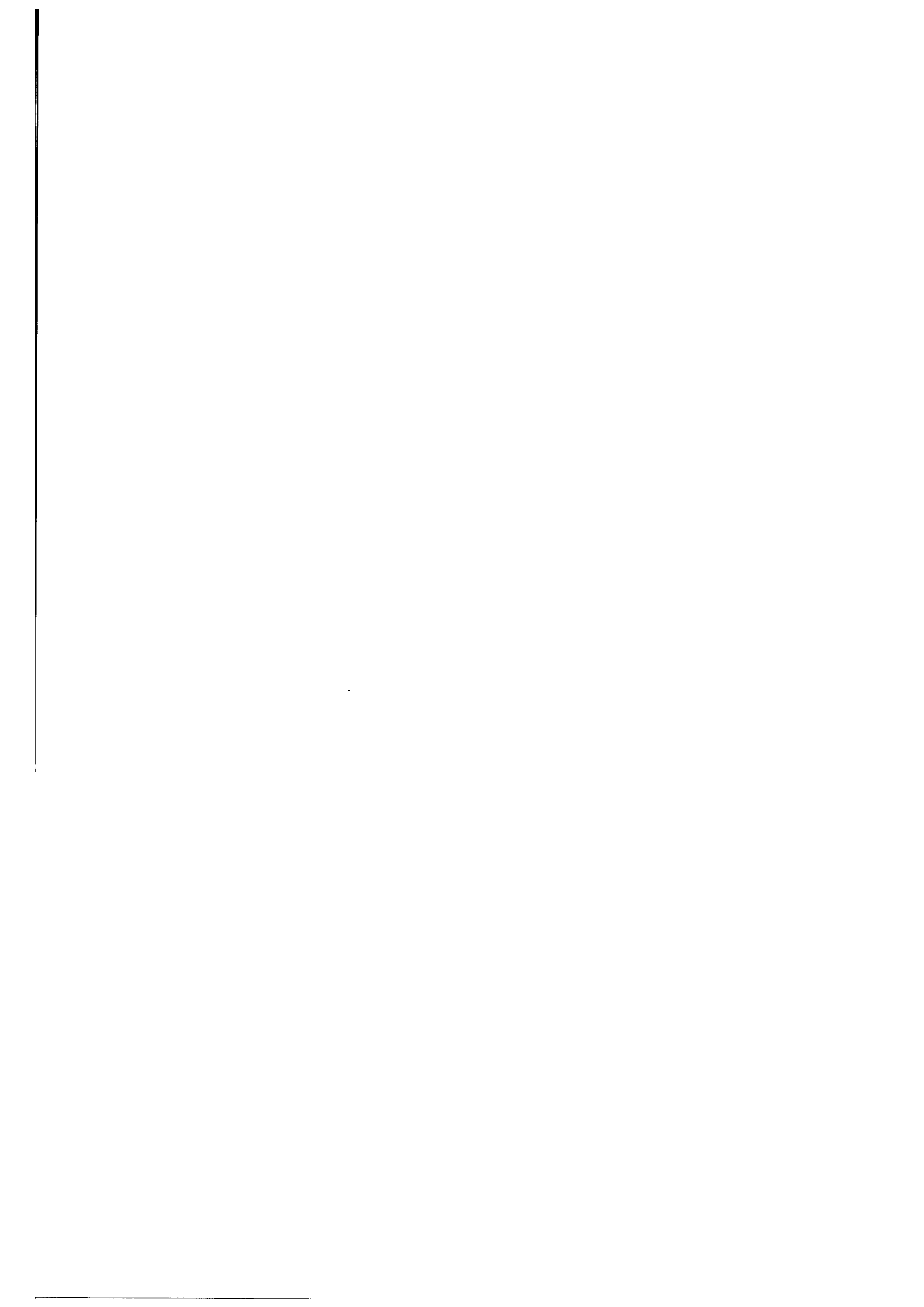
A national laboratory of legal metrology is currently in the process of realization.

5.4 Instrument calibration and evaluation systems

No information received.

6 Accreditation and certification systems

No information received.



1 Laws of metrology

The main federal acts governing metrology are:

- the Weights and Measures Act (1971),
- the Electricity and Gas Inspection Act (1981),
- the Consumer Packaging and Labelling Act (1974).

The government bodies responsible for the application of these acts (all part of the Department of Industry) update and publish regulations which have legal force. These regulations are entitled:

- the Weights and Measures Regulations,
- the Electricity and Gas Inspection Regulations,
- the Consumer Packaging and Labelling Regulations.

2 Legal units of measurement

The legal units of measurement in Canada are based on the International System of Units (SI) established by the Conférence Générale des Poids et Mesures.

The basic units of measurement and supplementary and derived units, along with their symbols, are listed and described in Parts I, II and III of Schedule I of the Weights and Measures Act.

In addition to the SI units, other customary units of measurement may also be used in Canada: Canadian units of measurement (Imperial System) and units of measurement to describe certain land in Quebec, found in Schedule II and III, respectively, of the Weights and Measures Act.

3 Instruments subject to legal control

All devices measuring weight, volume, length and area, and electricity and natural gas meters that are used in commercial transactions.

4 Metrological control of quantities

The Consumer Packaging and Labelling Act is administered by the Department of Industry (a federal department).

Regional and local offices serving all of Canada conduct the inspection of prepackaged products.

The Weights and Measures Act and the Consumer Packaging and Labelling Act require that products and services traded on the basis of measure are measured, priced and labelled accurately. The legislation applies to most trade transactions based on measure, including products sold in bulk; commodities packaged for wholesale and retail sale; and all services provided on the basis of measure (e.g. freight and shipping charges).

5 Services responsible for metrology

5.1 National service of legal metrology

Legal Metrology Branch
Industry Canada
301 Laurier Avenue West
5th Floor
OTTAWA, Ontario
K1A 0C9

Telephone: 1-613-952 2625 (Weights and Measures)
1-613-952 0635 (Electricity and Gas)
Fax: 613-952-1736

The national organization for legal metrology, the Legal Metrology Branch of Industry Canada, has two main components: Weights and Measures, and Electricity and Gas. Both have exclusive federal jurisdiction.

Weights and Measures is responsible for the enforcement of legislation to minimize inaccurate measurement and inequity in trade of goods and services provided on the basis of measurement.

Electricity and Gas is responsible for the enforcement of legislation to minimize inaccurate measurement and to ensure equity in the trade of electricity and natural gas. Seven engineers and twenty-seven technologists are involved in the device approval and measurement standards calibration and certification functions of the Legal Metrology Branch.

There are 370 inspectors, managers and clerical and technical support employees involved in the administration of the legal metrology statutes. These employees are located in five regional and over thirty district offices throughout Canada.

5.2 Local verification services

There are five regional services:

- Atlantic Region (office in Halifax),
- Quebec Region (office in Montreal),
- Ontario Region (office in Toronto),
- Prairie Region (office in Winnipeg),
- Pacific Region (office in Vancouver),

and over thirty district offices throughout Canada.

Each office is responsible for ensuring compliance with metrology acts and regulations for its particular geographic area.

5.3 Laboratories responsible for maintaining national measurement standards

National standards are kept at:

The National Research Council of Canada (NRC)
Division of Physics
Montreal Road
OTTAWA, Ontario,
K1A 0C9

The reference standards and other standards of measurement that are maintained by the Legal Metrology Branch of Industry Canada for the purpose of determining the accuracy of local standards used by inspectors, are calibrated and certified by the National Research Council of Canada.

5.4 Instrument calibration and evaluation systems

Only Industry Canada, through its Legal Metrology Branch, has the power in Canada to issue official certificates of calibration and inspection for measuring instruments used in trade. However, the National Research Council of Canada may undertake the evaluation and calibration of measuring instruments other than those used in trade, in particular instruments used in scientific laboratories.

6 Accreditation and certification systems

Under Section 10 of the Electricity and Gas Inspection Act, organizations may apply for accreditation status for the verification of electricity or gas meters. The applicant must satisfy the Legal Metrology Branch that an acceptable quality assurance programme has been developed and implemented. A properly designed quality assurance programme ensures that all products such as meters, documents, and records meet and continue to meet specified minimum requirements. Objective evidence that such a programme is in place provides the Legal Metrology Branch with the confidence required to ensure that national standards of measurement will be maintained.

Criteria organizations must meet before being granted accreditation are found in LMB-EG-05 Criteria and Procedures for the Accreditation of Electricity and Gas Meters.

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

A national accreditation programme, jointly administered by the Standards Council of Canada (SCC) and the Institute of National Measurement Standards (INMS) verifies the competence of calibration laboratories and evaluates their ability to perform accurate measurements within specified ranges of uncertainty.

The SCC has the legal mandate to accredit calibration laboratories, and assesses the administrative, financial and operational quality systems in place through the Program for Accreditation of Laboratories - Canada (PALCAN). The INMS, through the Calibration Laboratory Assessment Service (CLAS), assesses the capability of private and government laboratories to perform specified calibrations linked to basic physical standards maintained by the NRC.

In the future, measurements performed by accredited laboratories will, through the North American Calibration Cooperation, be recognized as equivalent to measurements performed by calibration laboratories in the United States and Mexico.

The NRC is responsible for primary standards of physical measurements as established by the Weights and Measures Act and the National Research Council Act. The INMS maintains national standards for all base units and for derived units for which there is a need. Weights and Measures provides a hierarchy of government-owned standards, traceable to NRC primary standards, for use in device and commodity inspection. Other Government of Canada calibration laboratories (i.e. National Defense) which perform calibrations for their operational units in support of their mandate, and accredited calibration laboratories, also have measurement standards traceable to NRC primary standards.

6.2 Legal and applied metrological activities in product certification

Weights and Measures is developing a programme to accredit Canadian device manufacturers, their authorized dealers, and third-party inspection businesses who do not sell devices, to perform inspections of devices before trade use commences. The scope of the programme is currently restricted to non-complex weighing and measuring devices which are pre-assembled and portable. The programme is scheduled for implementation in 1995.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

No information received.

1 Laws of metrology

1.1 The law on metrology of the People's Republic of China was adopted on 6 September 1985 and implemented on 1 July 1986.

1.2 Twenty-two rules, decrees and measures have been promulgated concerning the implementation of the law, legal units of measurement, compulsory verification, import of measuring instruments, metrological authorization, approval of new measuring instruments, licence for manufacture and/or repair of measuring instruments, measuring instruments subject to legal control, metrology accreditation of commodity inspection services, checking standards of measurement, reference materials, qualification of personnel engaged in verification, national primary standards, metrological supervision.

In order to implement the legal control of measuring instruments, 703 national verification regulations or calibration instructions and twenty-one technical norms and sixty-five national metrological verification systems (hierarchy schemes for measuring instruments) have been published by the State Bureau of Technical Supervision (SBTS).

Whenever any document concerning metrological law, rule, decree and regulation, etc. is laid down, the requirements of related international recommendations and documents of the OIML have generally been adopted.

2 Legal units of measurement

The International System of Units (SI) and other units of measurement adopted by the state are the national legal units of measurement.

3 Instruments subject to legal control

The law on metrology specifies that all of the highest standards of measurement used within departments, enterprises and institutes, and measuring instruments used in trade, safety protection, medical treatment and health and environmental monitoring, are subject to compulsory verification. A catalogue of these instruments was promulgated on 15 April 1987. It contains 111 kinds of instruments (fifty-five terms).

4 Metrological control of quantities

The SBTS is responsible for controlling the metrological work of the whole country, and the metrological administrative departments of provincial governments are responsible for the work of their region.

Metrological control has recently been extended to prepackaged products. A rule concerned the requirements of retail goods and some prepackaged products was promulgated in October 1993.

5 Services responsible for metrology

5.1 National service of legal metrology

State Bureau of Technical Supervision (SBTS)
4, Zhi Chun Lu, Hai Dian
BEIJING, 100088

Telephone: 86-10-202 5835
Fax: 86-10-203 1010

The SBTS is an executive department under the direct leadership of the State Council, and exercises the unified management, organization and coordination of technical supervision in the country. It also provides guidance for quality control.

The main responsibilities related to metrology are:

- preparation and implementation of metrological legislation, rules, regulations and instructions,
- promotion of legal measurement units and unification of the national measurement system,
- establishment of the national primary standards of measurement, the national verification system (hierarchy of measuring instruments), the national verification regulations and organization of the dissemination of units of physical quantities,
- working out, coordination and implementation of programmes for the development of metrology,
- organization of the control of manufacture, repair, sale, import and use of measuring instruments,

- accreditation, arbitral verification and mediation of disputes in the field of metrology,
- popularization and education related to legal metrology and training of personnel engaged in metrology,
- representation of China in international organizations and in international exchange and cooperation in the field of metrology.

5.1.1 State technical organs of legal metrology

- (a) National Institute of Metrology (NIM)
No. 7, District 11, Hepingli
BEIJING

Telephone: 86-10-4211631
Fax: 86-10-4218703

The National Institute of Metrology, founded in 1965, is responsible for the development and conservation of national primary standards. At present, numerous laboratories of length, mechanics, electromagnetics, microwave, time and frequency, ionizing radiation, optics and acoustics have been set up. The total number of staff is about 1600.

- (b) National Institute of Measurement and Testing Technology (NIMTT)
Shuinianhe, Dongfeng Road
CHENGDU, Sichuan

Telephone: 86-10-444 1512

The National Institute of Measurement and Testing Technology was set up in 1965 and serves as a national research base of measurement and testing technology. Its main tasks are:

- to carry out research on the theories and methods of measurement and testing technology and to develop precision measuring instruments,
- to establish and disseminate some of the national primary standards. There are over twenty laboratories.

- (c) The National Research Centre for Certified Reference Materials (NRCCRM)
No.7, District 11, Hepingli
BEIJING

Telephone: 86-10-421 9632

The NRCCRM was founded in 1989 and is a professional institute for research and development of certified reference materials. Its main tasks are:

- to study the general problems in the field of CRMs,
- to prepare and develop CRMs with high purity, trace and ultratrace components and physical-chemical properties,
- to develop standard measuring methods and provide standard data,
- to be responsible for the certification of advanced reference materials and give advice to industry.

- (d) State Metrological Centres in special fields

Fifteen State Metrological Centres have been set up by authorization of the SBTS and are responsible for metrological verification, testing and control in special fields. These are:

National Railway Track Scale Metrology Centre,
National Railway Tanker Car Volume Metrology and Inspection Centre,
National Metrology Centre for high voltage,
National Metrology Centre for large-flow measurement of crude oil,
National Marine Metrology Service,
National Metrology Station for large volumes in Fushun,
National Metrology Station for large volumes in Yancheng,
National Metrology Station for steam flow in Yantai,
Shenzhen Metrology Station of SBTS,
National Centre of Fiber Measurement,
National Textile Metrological Station,
National Telecommunication Metrological Station,
National Large Flowrate for Water Measurement Station,
National Metrological Volume Station of Ships' Tanks,
National Measurement Station of Mine Safety.

- (e) State Metrological Centres in economic cooperation zones

To date, seven State Metrological Centres have been set up and are responsible for providing a calibration service in economic cooperation zones. These are:

Northeast Metrology and Testing Centre,
North Metrology and Testing Centre,
East Metrology and Testing Centre,

Northwest Metrology and Testing Centre,
 South-middle Metrology and Testing Centre,
 South Metrology and Testing Centre,
 Southwest Metrology and Testing Centre.

5.1.2 Other metrological organs

- (a) China Institute of Metrology (CIM) Telephone: 86-571-885024
 3rd Jiaogong Road
 HANGZHOU

The China Institute of Metrology is China's sole higher education institute for training engineers, technicians and managers in the field of metrology. It consists of two departments, a division of basic courses and a division of metrological research. At present, student enrolment totals 1000 and about 800 students take correspondence courses. The institute provides a four-year regular programme for engineers and a two-year programme for technicians and has a teaching and administrative staff of about 500, of which about 300 are professors, associate professors, instructors, assistants and engineers.

- (b) China Technical Supervision Press Telephone: 86-10-4218685
 No. A2, West Hepingli
 BEIJING

The press issues a newspaper and a magazine, *Technical Supervision*, which reports on experience in this field (including metrology).

- (c) Management Research Institute of SBTS Telephone: 86-10-4219988
 No. 7, District 11, Hepingli
 BEIJING

This institute is responsible for studying the structure, efficiency and social economy of the technical supervision system (including metrology).

- (d) China Information Service for Technical Supervision Telephone: 86-10-4219988
 No. 7, District 11, Hepingli
 BEIJING

This service provides a comprehensive analysis of technical supervision at home and abroad (including metrology), edits and publishes several journals, including *Measurement Technique*, *Measurement Abstracts*, *Factory Measurement and Test*, *Information on Metrology*.

- (e) China Metrology Publishing House Telephone: 86-10-4219988
 No. 7, District 11, Hepingli
 BEIJING

Publisher of books on science and technology, education and management, and national verification regulations, also produces cassettes and videotapes closely related to measurement and testing technology.

- (f) Chinese Society for Measurement (CSM) Telephone: 86-10-4218709
 No. 7, District 11, Hepingli
 BEIJING

The Chinese Society for Measurement, founded in 1962, has eighteen technical committees and 11 000 members. The purpose of the Society is to unite professionals in this field to promote the development of measuring science and technology and to popularize scientific and technological knowledge. The Society edits a quarterly publication, *Acta Metrologica Sinica*, and various *Proceedings*.

5.2 Local verification services

The local administration of legal metrology comprises thirty administrative units of local government at provincial level (not including Taiwan), 305 at city level and 1864 at county level. These units are responsible for the metrological control in the related localities.

The local technical metrology inspection services comprise thirty-five legal metrology verification institutes at provincial level, 350 metrological calibration units at city level and 2654 units at county level. The personnel in charge of metrological verification and calibration in these units number 27 427 and there are 13 622 metrological supervisors throughout the country.

5.3 Laboratories responsible for maintaining national measurement standards

See Sections 5.1.1 (a) and (b).

5.4 Instrument calibration and evaluation systems

Some industrial departments of the State Council have set up their own metrological technical institutes responsible for verification and calibration of certain measuring instruments as authorized by the SBTS.

Most enterprises have their own metrological laboratories responsible for verification and calibration for the measuring instruments used in-house, which are required to meet the law on metrology and are authorized by the SBTS.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The Chinese accreditation system for testing laboratories developed by the SBTS was launched in 1985. The accreditation criteria are those of ISO Guides 25 and 38. Over 900 national laboratories and 5200 local laboratories have been accredited. A standard examination, with similar conditions to the accreditation system, was the only requirement for calibration laboratories until recently. The calibration laboratories will be accredited according to ISO Guides 25 and 38 in the near future.

All the accreditation requirements are traceable to national standards.

6.2 Legal and applied metrological activities in product certification

All the certification bodies require certified factories to maintain traceability to national standards. Whenever factories carry out certification, they ask the metrology service for assistance. They should follow the instrument regulations developed by the SBTS.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

No information received.

1 Laws of metrology

The application of metrology in the Republic of Cuba is regulated by the documents of the National System of Standardization, Metrology, and Quality, as well as by the resolutions passed by the National Office of Standardization, in cooperation with other bodies of the Central State Administration.

The country has issued a number of metrological standards (NC) and standard-type instructions (INC). Since 1976 these documents have been approved by the CEN, but will now be carried out by the National Office of Standardization of the Ministry of Economy and Planification. The status of the standards is in many cases compulsory and in others recommended. Such technical documents are supported by the state, which gives them legal force.

2 Legal units of measurement

The International System of Units is implemented by the Decree-Law No. 62 of 30 December 1982, issued by the Council of the State.

3 Instruments subject to legal control

Only duly verified measuring instruments are authorized for use in the country, provided that the results of such verification are satisfactory.

Special attention must be paid to certain measuring instruments which, depending on the use for which they are intended, require compulsory verification by the Central State Administration.

The appropriate regulations are stated in NC 00-30:78, and include the following:

- those used as standards for the transmission of measurement units,
- those related to the control of valuable materials, commercial transactions, health care, occupational safety and hygiene, measurement of sporting records and scientific research,
- those used in inspections made by the state,
- those used to resolve conflicts between enterprises and other bodies on questions of measurement.

4 Metrological control of quantities

The country exerts metrological control over quantities such as mass, length, volume, pressure, temperature, electricity, time, frequency, laser, physical-chemistry, etc, by state inspection authorized by NC 00-30:78.

5 Services responsible for metrology

5.1 National service of legal metrology

The National Office of Standardization is responsible for metrology.

National Bureau of Standards
Calle E No. 261 entre 11 y 13, Vedado
LA HABANA 10400

Telephone: 53-7-300 825
53-7-300 022
53-7-300 835
Fax: 53-7-338 048

In order to carry out its functions of management, organization, execution, development, research and control of metrological activities, the National Office of Standardization relies on the Research Metrological Institute (INIMET), located in Havana City; six Territorial Metrological Centers (CTM) located in Villa Clara, Camagüey, Santiago de Cuba, Holguín, Ciego de Avila and Cienfuegos, and other state metrological laboratories located in Matanzas, Sancti Spiritus and Las Tunas.

5.2 Local verification services

The regional and local verification services are carried out by the INIMET, the CTMs, the state metrological laboratories and the verification laboratories of the Central State Administration.

5.3 Laboratories responsible for maintaining national measurement standards

The INIMET is responsible for the custody of national measurement standards.

5.4 Instrument calibration and evaluation systems

The calibration of standards is undertaken by the INIMET, the CTMs and the state verification laboratories. Working instruments are calibrated by state-approved verification laboratories which form part of the Central State Administration. Their methodology is drawn up by the state and they have to meet all requirements to carry out such verification or calibration.

The current main fields of interest are evaluation systems for the sugar, citrus and cement industries.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The INIMET is a member of the Certification Commission of Laboratories of the national economy and carries out the accreditation of calibration laboratories of enterprises.

Traceability of national standards is assured through comparisons with the standards of Germany, Russia and the People's Republic of China, and Cuba holds the hierarchy schemes of its standards.

6.2 Legal and applied metrological activities in product certification

The INIMET testing laboratory certifies or approves models of instruments or measuring devices and certifies items presented by the national economy.

The INIMET is responsible for the certification of reference materials.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

We are working on the application of ISO 9004-2 and the Models of ISO 9001, 9002 and 9003, considering the particular aspects of each laboratory.

1 Laws of metrology

- The Weights and Measures Laws of 1974 to 1985, Nos 19/74, 73/77 and 48/85.
- The Weights and Measures (Units of Measurement) Regulations of 1990, No. 134/90.
- The Weights and Measures (Packaged Commodities) Regulations of 1977, No. 121/77.
- The Weights and Measures Regulations of 1981, No. 84/81.

2 Legal units of measurement

The legal units of measurement are the SI units and other units used with the International System.

3 Instruments subject to legal control

All instruments for the measurement of mass, length and volume used in commercial transactions.

The legal control of other instruments, such as watermeters, taximeters, etc., is carried out by other governmental or quasi-governmental agencies.

4 Metrological control of quantities

The Weights and Measures Laws and the Weights and Measures (Packaged Commodities) Regulations of 1977 regulate the control of prepackaged products. This control is based on relevant EC Directives.

5 Services responsible for metrology

5.1 National service of legal metrology

The Weights and Measures Service
Ministry of Commerce and Industry
NICOSIA

Telephone: 357-2-403441
Fax: 357-2-366120
Telex: 2283 MIN COMIND Nicosia

5.2 Local verification services

There are no regional or local verification services, the central office being responsible for the whole of the country.

5.3 Laboratories responsible for maintaining national measurement standards

The national standards for mass, length, volume and capacity are kept in the metrology laboratory of the Weights and Measures Service.

5.4 Instrument calibration and evaluation systems

No information received.

6 Accreditation and certification systems

No information received.

(*) Information collected in 1990.

1 Laws of metrology

The basic legal metrology documents are Law No. 505/1990, On Metrology, effective as of 1 February 1991, prepared in compliance with OIML International Document D 1, Law on Metrology, and Law No. 20/1993, On implementation of the state administration in the field of standardization, metrology and state testing, effective as of 1 January 1993.

Also, Decree No. 69/1991, effective as of 1 April 1991, sets out procedures for the practical implementation of the above Law, On Metrology, and Decree No. 231/1993 effective as of 3 September 1993, amending Decree No. 69/1991.

2 Legal units of measurement

The duty to use the International System of Units (SI), listed in the Czech National Standard ČSN 01 1300 (approved in 1987 and amended in 1992), is prescribed by Law No. 505/1990, On Metrology.

Under ČSN 01 1300, the general implementation of SI units according to ISO 1000 has been achieved throughout the Czech Republic.

3 Instruments subject to legal control

Working measuring instruments subject to mandatory verification ("legal measuring instruments") by Law No. 505/1990 are listed in Ordinance No. M-102/1994 dated 24 October 1994. Validity periods for the verification of these legal measuring instruments are also given in this Ordinance. The terms of updating of this Ordinance depend on current needs (e.g. the previous Ordinance was dated 19 October 1993).

Newly manufactured types of measuring instrument covered by legal metrology are subject to compulsory pattern approval before they are put on the market. Other types of newly produced measuring instrument can be presented for pattern approval on request.

The principal measurement standards in a company (i.e. basic standards for traceability purposes) for legal metrology instruments are also subject to compulsory verification. The validity period for the verification of measurement standards is determined individually by a metrological body.

4 Metrological control of quantities

National metrology bodies verify measuring instruments used in the filling process of prepackaged commodities when they are legal instruments. The metrological control of quantities properly speaking is provided by a separate national body.

5 Services responsible for metrology

5.1 National service of legal metrology

Based on Law No. 20/1993, the following national administrative bodies are concerned with metrology:

- Ministry of Economy of the Czech Republic,
- Czech Office for Standards, Metrology and Testing (COSMT),
- Czech Metrological Institute (CMI).

Activities of these state bodies in the field of metrology are specified by the above Law. Generally both the COSMT and the CMI come under the supervision of the Ministry; but since June 1994 the CMI has been subject to the control of the COSMT.

Czech Metrological Institute
Okružní 31
63800 BRNO

Telephone: 42-5-52 87 55
Fax: 42-5-52 91 49

5.2 Local verification services

Verification of measuring instruments which are subject to state metrological control is carried out by state administrative bodies authorized in the field of legal metrology.

As regards regional/local verification services, there are seven Regional Inspectorates (CMI OI; regional activity), some of them having branches; the Laboratory of Primary Metrology (CMI LPM; national activity) and the Inspectorate for Ionizing Radiation (CMI IIZ; national activity). Each of these laboratories is an integral part of the CMI.

There are also Authorized Metrological Centres (SMS; currently numbering about 150 that have been authorized by the COSMT to perform certain activities within the field of state metrological control, including verification. The SMS centres are supervised by the CMI.

5.3 Laboratories responsible for maintaining national measurement standards

The national measurement standards are maintained by the CMI; this institute undertakes research in the different fields of metrology, develops new measurement standards, establishes and applies metrology regulations, etc. Certain national measurement standards are maintained by other institutions, e.g. the Czech Academy of Sciences, universities.

5.4 Instrument calibration and evaluation systems

Calibration of working measuring instruments (as a voluntary control) specified by the law is performed by CMI laboratories. There is also a system of Calibration Services Centres (SKS), about fifty of which have been accredited according to national regulations (validity of this accreditation terminates 31 December 1995), and about ten which have been accredited according to EN 45000. The number of SKS providing calibration services without EN or any other accreditation is still significant.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The accreditation system in the Czech Republic is now compatible with that used within the EC countries. The Czech Institution for Accreditation (CIA), one of the executive bodies of the Ministry of Economy, is responsible for implementing the accreditation system. CMI experts take part in accreditation activities.

The traceability of secondary standards to national standards and national standards to international standards (BIPM) and to standards of significant European metrological institutions (PTB, NPL, etc) is provided and coordinated by the CMI.

6.2 Legal and applied metrological activities in product certification

CMI laboratories verify and/or calibrate measuring instruments and appliances appointed for product evaluation subject to certification.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

CMI laboratories verify and/or calibrate measuring instruments and appliances used within ISO 9000 quality management systems. The CMI takes part in training of experts for this purpose and also evaluates metrological instructions and/or directives.

1 Laws of metrology

Act on Development of Trade and Industry No. 394, June 1990.

Detailed regulations are issued either as Statutory Orders ("Bekendtgørelser") issued by the Ministry of Industry or the Danish Agency for Development of Trade and Industry or as Technical Directives ("Måletekniske Direktiver" (MDIR)).

The main regulations are:

- Bekendtgørelse No. 73, 1992: Authorization of the Danish Agency for Development of Trade and Industry
- Bekendtgørelse No. 95, 1983: Provisional arrangement of metrological control
- Bekendtgørelse No. 142, 1985: "e"-marking of prepackaged products
- Bekendtgørelse No. 516, 1986: The International System of Units (SI)
- Bekendtgørelse No. 585, 1987: Metrological regulation for measurement of mass
- Bekendtgørelse No. 573, 1988: EC Directive 71/316/EEC on Pattern approval and initial verification
- Bekendtgørelse No. 597, 1994: EC Directive 90/384/EEC on non-automatic weighing instruments
- Bekendtgørelse No. 197, 1994: Metrological control of measurement of gas for accounting purposes
- Bekendtgørelse No. 262, 1994: Metrological control of measurement of heat energy for accounting purposes
- MDIR No. 32.46-01, 1983: Measuring systems for liquids other than water
- MDIR No. 32.46-02, 1976: Meters for liquids other than water
- MDIR No. 22.07-01, 1987: Semi-automatic alcohol meters.

Laws, Statutory Orders and Directives may have limited application on Greenland and the Faroe Islands.

2 Legal units of measurement

The International System of Units (SI) is used throughout the society and in particular for all instruments subject to regulations (Bekendtgørelse No. 516, 1986: The International System of Units [SI]).

3 Instruments subject to legal control

- weighing instruments and weights
- instruments for measuring mass or volume of liquids other than water
- gas meters
- heat energy meters
- fish-net meters.

4 Metrological control of quantities

Regulations and control of prepackaged products conform to EC directives. Control is performed by laboratories authorized by the Agency.

5 Services responsible for metrology

5.1 National service of legal metrology

Division of Metrology
Danish Agency for Development of Trade and Industry
Ministry of Business and Industry
Tagensvej 137
DK-2200 COPENHAGEN N

Telephone: 45-35-86 86 86
Fax: 45-35-86 86 87
Telex: 15768 indtra dk

The Danish Agency for Development of Trade and Industry has the authority to lay down regulations on units of measurement, measuring instruments and measurement quantities.

Furthermore the Agency has the overall responsibility for granting pattern approval of measuring instruments, for initial and subsequent verification and inspection.

Pattern evaluation is carried out by laboratories accredited by Danish Accreditation (DANAK) to perform testing leading to pattern approval.

Pattern approval is granted either by the Danish Agency for Development of Trade and Industry or by accredited bodies with a special authorization from the Agency which allows them to grant pattern approvals within a specified range of instruments.

Initial and subsequent verification is carried out by bodies accredited by DANAK and authorized for the purpose by the Danish Agency for Development of Trade and Industry.

Inspection is carried out by the Danish Agency for Development of Trade and Industry.

Names and addresses of accredited laboratories and authorized bodies may be furnished upon request.

5.2 Local verification services

Local verification is carried out by authorized laboratories, throughout the country, assuring an appropriate nationwide service.

5.3 Laboratories responsible for maintaining national measurement standards

Based on an authorization from the Danish Agency for Development of Trade and Industry, an accredited laboratory may be given custody of a national measurement standard at primary or sub-primary level.

5.4 Instrument calibration and evaluation systems

The Danish Calibration Service comprises a number of calibration laboratories accredited by Danish Accreditation (DANAK).

The calibration facilities are supervised by DANAK and the laboratories are listed in *Register of accredited laboratories*, issued by DANAK.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

Law No. 229 of 1951 made the use of the metric system compulsory and exclusive, and specified the limits of error for balances, weights and length measures (table 2) and denominations to be used (table 4). This basic law has been amended on several points by more recent decrees. The last issued law covering the legal metrology sector is law No. 69 of 1976.

2 Legal units of measurement

The International System of Units (SI) is exclusively used for trade and industry in the country.

3 Instruments subject to legal control

- instruments and measures used for trade covering mass, length and volume (controlled by the Assay, Weights and Measures Administration),
- electrical energy meters (controlled by the Organization for Electrical Distribution),
- taximeters (controlled by the Traffic Department).

4 Metrological control of quantities

The net content control (mass, volume, length) is the responsibility of the Assay, Weights and Measures Administration.

Standards for prepackages are dealt with by the Egyptian Organization for Standardization and Quality Control (EOS).

5 Services responsible for metrology

5.1 National service of legal metrology

There are three main organizations concerned with metrology, measurements and calibration in the National Metrology System of Egypt, covering different branches: trade, industry, education and scientific research, etc.

5.1.1 National Institute for Standards (NIS)

The National Institute for Standards is part of the Academy of Scientific Research and Technology and is in charge of scientific metrology.

The principal functions and activities of the NIS are:

- maintenance of the national measurement standards of physical units and their use for the purpose of measurement and calibration,
- undertaking research work related to measurements,
- calibration of high-precision measuring devices for scientific, industrial and technological laboratories,
- giving advice, on request, to industry and public services on problems related to measurement,
- offering training opportunities for metrologists in different laboratories,
- preparing standard reference materials and providing the laboratories with these standards.

The National Institute for Standards represents Egypt in its cooperation with the BIPM.

National Institute for Standards
Tersa Street, El Haram
PO Box 136
GIZA
Code No. 12211

Telephone: 20-2-386 7451 (2, 3, 4)
Fax: 20-2-386 7451

5.1.2 Assay, Weights and Measures Administration

The Administration is part of the Ministry of Supplies and Interior Trade, and is in charge of legal metrology. Its essential aims are:

- verification and stamping of measuring instruments used for trade, length, volume, weights, gas meters, water meters, fuel dispensers,
- maintenance of measuring instruments for the items above,

- regular inspection for measuring instruments related to the field of trade,
- assay and stamp all gold, silver products and materials and precious stones.

Assay, Weights and Measures Administration
 Beat el Kady, Gamalia
 CAIRO

Telephone: 20-2-904651, 20-2-908251, 20-2-904544
 Cable: DAMGHZEEN

5.1.3 Egyptian Organization for Standardization and Quality Control (EOS)

The EOS is part of the Ministry of Industry and its essential activities are:

- to elaborate standard specifications for raw materials and products of all the industrial sectors in Egypt,
- to secure reference standards for calibration and verification of measures and measuring instruments,
- to ensure the existence of standard systems for technical classification, definition, terminology and symbols,
- to provide the necessary measures for quality control of raw materials and products in conformity with the standard specifications.

The EOS now has a Quality Control Centre consisting of testing laboratories for quality control and calibration of measuring instruments.

There are two general departments of the EOS to carry out measurements and calibration activities:

A – General Department for measurement

This elaborates standard specifications for measuring instruments and calibration methods, and collects technical data and information on measuring instruments in the industrial field.

B – General Department for industrial measurements and metrology

This holds reference standards for calibration and verification of measuring instruments and measures in the industrial field. It is divided into three divisions:

Mechanical measurements, consisting of the following laboratories:

- length-thread, angular-velocity
- pressure measuring instruments
- force, hardness measuring instruments
- weighing instruments
- volume measuring instruments

Physical measurements, consisting of the following laboratories:

- industrial and medical thermometers
- viscosity, density
- flash point
- electrical, optical and temperature measuring instruments

Electrical measurements, consisting of the following laboratories:

- DC measuring instruments
- AC measuring instruments
- resistance, inductance and capacitance
- time measuring instruments

The EOS represents Egypt in the following international organizations: ISO, OIML, IMEKO, ARSO and ASMO.

Egyptian Organization for Standardization and Quality Control (EOS)
 2 Latin America Street
 Garden City
 CAIRO

Telephone: 20-2-3549720
 Fax: 20-2-3557841
 Telex: 93296 EOS UN
 Cable: TAWHID

5.2 Local verification services

No information received.

5.3 Laboratories responsible for maintaining national measurement standards

No information received.

5.4 Instrument calibration and evaluation systems

No information received.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

Weights and Measures proclamation No. 208 of 1963 and Legal Notice No. 431/1973, Weights and Measures Regulations.

2 Legal units of measurement

Ethiopia has adopted the International System of Units as legal units of measurement to be used in commercial transactions.

3 Instruments subject to legal control

Currently the instruments which are subject to legal control are as follows:

- length measures
- ordinary commercial balances
- ordinary commercial weights
- volume measures:
 - a) ordinary commercial measures
 - b) precision capacity measures
 - c) mobile tanks
 - d) fuel dispensers and large flow meters.

In addition to the above, a wide variety of measuring instruments will come under legal control in the near future when the new proclamation on Metrology is approved by the government.

4 Metrological control of quantities

No information received.

5 Services responsible for metrology

The Ethiopian Authority for Standardization is the sole body responsible for the national service of legal metrology, and is the custodian of the national primary standards.

Ethiopian Authority for Standardization
P.O. Box 2310
ADDIS ABABA

Telephone: 251-1-61 01 11
Fax: 251-1-61 31 77
Telex: 21725 ETHSAETH
Telegram: ETHIOSTAN

6 Accreditation and certification systems

No information received.

1 Laws of metrology

- Act on measurement units and national measurement standards (1156/93)
- Act on verification of measuring instruments (219/65), amendments (321/92, 1157/93, 1383/94)
- Decree on units of measurement (371/92)
- Decree on national measurement standards (972/94)
- Decree on verification of measuring instruments (370/92)
- Decree on the accreditation of bodies performing testing, inspection and calibration (1568/91).

Metrological regulations are issued by the Ministry of Trade and Industry in accordance with the law.

Finland is a member state of the European Union and implements the EC Directives.

2 Legal units of measurement

The legal units of measurement are those of International System of Units and some other units specified in Decree 371/92. The legal units must be used if measurements are prescribed by law, if measurements are of economic importance or if they affect public safety or health.

3 Instruments subject to legal control

Instruments for the measurement of mass, length, area, volume, and thermal energy in commercial transactions of public nature. Taximeters are controlled by traffic authorities.

4 Metrological control of quantities

Market surveillance of prepacked products is performed by the National Food Administration. A Technical Inspection Centre has been nominated as the competent department specified in the EC Directives on prepackaging.

5 Services responsible for metrology

5.1 National service of legal metrology

Teknillinen tarkastuskeskus
(Technical Inspection Centre)
Weights and Measures
PL 204
FIN-00181 HELSINKI

Telephone: 358-0-61671
Fax: 358-0-616 7466

The Technical Inspection Centre/Weights and Measures carries out pattern approval of measuring instruments and has the technical responsibility for the regional verification service. Weights and Measures employs twelve persons with technical education.

The number of pattern approvals has in the last few years varied between 40 and 80. The total number of verifications in 1993 was approximately 53 000.

5.2 Local verification services

The enforcement of regulations on verification of measuring instruments used for trade is the responsibility of the District Administration of the Technical Inspection Centre. The country is divided into eight Inspection Districts, each having a District office. Some districts have several local offices. There are some 25 verification officers, who have a technical education corresponding to B.Sc. level. The verification officers are given additional training on special courses.

5.3 Laboratories responsible for maintaining national measurement standards

According to Act 1156/93 :

Mittatekniikan keskus
(Centre for Metrology and Accreditation)
PL 239, FIN-00181 HELSINKI

Telephone: 358-0-61671
Fax: 358-0-616 7467

FINLAND

The Centre has overall responsibility for these national measurement standards, and makes agreements with these laboratories having the best national resources on the realization, maintenance and dissemination of these standards.

The Centre for Metrology and Accreditation maintains the national standards laboratories for mass, pressure and temperature.

National standards laboratory for basic electrical quantities, time and frequency:

VTT Automaatio
(Technical Research Centre of Finland, Automation)
PL 1304
FIN-02044 VTT
ESPOO
Telephone: 358-0-4561

National standards laboratory for dimensional quantities:

VTT Valmistustekniikka
(Technical Research Centre of Finland, Manufacturing Technology)
PL 1702
FIN-02044 VTT
ESPOO
Telephone: 358-0-4561

National standards laboratory for length (the Vaisala quartz meter system), geodetic base lines and acceleration of free fall:

Geodeettinen laitos (Geodetic Institute)
Ilmalankatu 1 A
FIN-00240 HELSINKI 24
Telephone: 358-0-410 433

National standards laboratory for high frequency electrical units:

Telecom Finland Oy
Tele-Engeneering
PL 65
FIN-00211 HELSINKI
Telephone: 358-2040 4475
Fax: 358-2040 4489

National standards laboratory in the field of ionizing radiation based on special legislation:

Säteilyturvakeskus
(Finnish Centre for Radiation and Nuclear Safety)
PL 14
FIN-0000881 HELSINKI
Telephone: 358-0-759 881
Fax: 358-0-7598

5.4 Instrument calibration and evaluation systems

The national standards laboratories calibrate on request measuring instruments in their field of competence and issue official calibration certificates.

The Centre for Metrology and Accreditation, Finnish Accreditation Service (FINAS) has accredited 26 calibration laboratories, which can also issue official calibration certificates.

The Technical Research Centre of Finland offers a wide range of instrument evaluation and test services, especially to industry and various governmental organizations.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

According to the Act 1568/91, the Centre for Metrology and Accreditation accredits bodies for calibration, testing, inspection and certification. The Finnish Accreditation Service (FINAS) has to date accredited 26 calibration laboratories and 28 testing laboratories.

The FINAS is a member of the European Cooperation for Accreditation of Laboratories (EAL).

According to a Council of State resolution, the competence of the testing and certification bodies notified under EC Directives to carry out conformity assessment procedures, is assessed by the Centre for Metrology and Accreditation using general criteria complying with the EN 45000 standards. Accreditation is not mandatory but recommended for legal metrology services. Notified bodies may use test results obtained by accredited laboratories.

Measuring instruments calibrated within the national calibration service and accompanied by an official calibration certificate have a guaranteed traceability to either national or international measurement standards.

6.2 Legal and applied metrological activities in product certification

No information received.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

Accreditation of certification bodies is based on the EN 45000 standards which require that measuring instruments have to be traceably calibrated or verified.

1 Laws of metrology

- Law of 4 July 1837
- Decree No. 61 501 of 3 May 1961 concerning units of measurement and control of measuring instruments, amended by Decrees:
 - No. 66-16 of 5 January 1966
 - No. 75-1200 of 4 December 1975
 - No. 82-203 of 26 February 1982
 - No. 85-1500 of 30 December 1985
 - No. 88-682 of 6 May 1988 (one article relative to amendment)
- Decree No. 88-682 of 6 May 1988 relative to control of measuring instruments
- Decree of 30 November 1944 regulating the control of measuring instruments (articles 24 to 26)
- Decree No. 73-788 of 4 August 1973 concerning the European Community regulation of measuring instruments amended by decree No. 84-1107 of 6 December 1984 and by decree No. 88-682 of 6 May 1988
- Ministerial order of 1 March 1990 determining the mode of application of certain provisions in the decree of 6 May 1988 concerning the control of measuring instruments
- Ministerial order of 8 November 1973 determining the mode of application of decree No. 73-788 of 4 August 1973 concerning the EC regulation of measuring instruments amended by decree of 13 December 1984.

2 Legal units of measurement

The legal system of units of measurement is the International System of Units (SI) completed by the units used in connection with the SI.

The legal units shall be used for the measurement of quantities in the fields of the economy, health, public safety, education and in operations of an administrative nature.

However, with the exception of measuring instruments which shall only indicate legal units, other units may be added to the indication in legal units provided they are shown in a typesize not exceeding that of the indication in legal units.

3 Instruments subject to legal control

At 1 August 1990 the following categories were regulated:

- all instruments for weighing, volume, area and length measurement (with the exception of geodetic instruments and instruments for dimensional measurement in industry)
- instruments used for prepackaging (filling machines and checkweighers)
- measuring container bottles
- containers, road and rail transport tanks, vats and storage tanks (these containers are subject to gauging allowing a certificate to be issued indicating the volume of the liquid as a function of the level of the liquid in the container)
- containers used for production, storage or transport of liquids subject to taxes (concerns mainly wines and spirits)
- domestic electrical energy meters, heat meters, meters for measuring the volume of gas, cold water, hot water and alcohol
- orifice meters for gas
- instruments used for counting in commercial transactions
- instruments for measuring the mass per hectolitre of cereal grain
- moisture meters for cereal grain
- saccharimeters for beetroot
- refractometers for grape must
- alcoholometers
- density meters for beetroot juice, beer, must
- clinical thermometers
- instruments for the measurement of carbon monoxide in car engine exhaust gas
- taximeters
- chronotachographs
- road control speed meters
- illuminance meters (luxmeters)

- sound-level meters
- ethylometers
- tyre pressure gauges

4 Metrological control of quantities

Prepackaged products are subject to metrological control. The regional technical administrations (Directions régionales de l'industrie et de la recherche) carry out the controls at the level of production.

The general administration concerned with competition, consumer affairs and repression of fraud (Direction générale de la concurrence, de la consommation et de la répression des fraudes) carries out controls both at the level of production and at points of sale.

5 Services responsible for metrology

The Sous-direction de la métrologie and the Directions régionales de l'industrie et de la recherche are in charge of the application of the system of legal units of measurement (fulfilment of the main law of 4 July 1837).

The Bureau National de Métrologie (BNM), created by decree No. 69-845 of 29 May 1969, is an interministerial liaison body whose scope is to stimulate and coordinate the activities undertaken by the various ministries in the field of metrology and in particular enhance studies and research, harmonize the development of the work of the laboratories and services concerned, and represent at a technical and scientific level the metrology bodies in activities related to the BIPM.

5.1 National service of legal metrology

The application of legal metrology is made at two levels:

The central legal metrology administration of the ministry in charge of industry within the Direction générale de l'Industrie is conducted by:

Sous-Direction de la Métrologie
22, rue Monge
75005 PARIS

Telephone: 33-1-43 19 51 40
Fax: 33-1-43 19 51 36

This service aims to:

- organize and apply the legislation and regulations in the field of legal metrology and units of measurement (pattern approvals, procedures of intervention, etc.) and assist in international negotiations on this subject.
- define and apply policies relative to scientific and industrial metrology in liaison with Bureau National de Métrologie (BNM).

5.2 Local verification services

At regional level, the application of legal metrology is conducted by twenty-four Directions régionales de l'industrie, de la recherche et de l'environnement (DRIRE) which, among other responsibilities, stimulate and coordinate, within the twenty-four regions, activities pertaining to legal metrology and apply the directives of central administration. The total number of staff of the regional directorates amounts to about 3 000 of which some 250 are employed full time on metrology activities. Inspectors are sworn in and may establish official reports for legal purposes.

In addition, numerous in-service controls of measuring instruments are made by specially accredited bodies.

Publication: The *Revue de métrologie pratique et légale*, published monthly, contains the official texts in the field of legal metrology issued in the month concerned, as well as the approved patterns during the same period.

Revue de métrologie pratique et légale
102, rue de la Tour
75016 PARIS

Telephone: 33-1-45 04 80 11
Fax: 33-1-45 03 29 32

5.3 Laboratories responsible for maintaining national measurement standards

The national measurement standards representing the legal units of measurement are deposited in the laboratories designated by the Bureau National de Métrologie which also defines the conditions under which these standards shall be preserved (decree No. 75-213 of 24 April 1975).

These laboratories are the following:

Mechanics, thermodynamics, radiometry and photometry:

Institut National de Métrologie (INM)
292, rue Saint-Martin
75141 PARIS CEDEX 03

Telephone: 33-1-40 27 21 55
Fax: 33-1-42 71 37 36

Electricity and magnetism:

Laboratoire Central des Industries Electriques (LCIE)
33, avenue du Général Leclerc
BP N° 8
92260 FONTENAY AUX ROSES

Telephone: 33-1-40 95 60 00
Fax: 33-1-40 95 60 95

Time and frequency:

Laboratoire Primaire du Temps et des Fréquences
Observatoire de Paris
61, avenue de l'Observatoire
75014 PARIS

Telephone: 33-1-40 51 22 21
Fax: 33-1-43 25 55 42

Ionizing radiation:

Laboratoire Primaire des Rayonnements Ionisants (LMRI)
BP 52
91193 GIF SUR YVETTE CEDEX

Telephone: 33-1-69 08 52 88
Fax: 33-1-69 08 47 73

Other official laboratory (cooperating in OIML activities):

In the field of length, mass, force, pressure, temperature, density, viscosity, radiometry, photometry and acoustics:

Laboratoire National d'Essais (LNE)
1, rue Gaston Boissier
75015 PARIS

Telephone: 33-1-40 43 37 00
Fax: 33-1-40 43 37 37

5.4 Instrument calibration and evaluation systems

The fifteen Chaînes d'étalonnage (calibration chains) are managed by COFRAC, Division of Calibration, which comprises 34 officially accredited calibration centres and 216 authorized calibration services.

COFRAC
37, rue de Lyon
75012 PARIS

Telephone: 33-1-44 68 82 20
Fax: 33-1-44 68 82 22

Information can be provided by:

Bureau National de Métrologie (BNM)
22, rue Monge
75005 PARIS

Telephone: 33-1-43 19 36 36
Fax: 33-1-43 19 50 80

The BNM publishes a quarterly revue containing technical and scientific papers, the *Bulletin du BNM*, and monography (published by Chiron, Paris).

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The DRIRE (see Section in 5.2) accredit bodies for periodical verification of certain categories of measuring instrument subject to legal metrology on the basis of standard EN 45001.

In other fields, the accreditation system is managed by COFRAC Division of Calibration (see Section 5.4), for calibration laboratories, and by COFRAC, Division of Tests, for testing laboratories, on the basis of the EN 45000 series of standards.

6.2 Legal and applied metrological activities in product certification

In the field of legal metrology, manufacturers that have established a quality system in conformity with the ISO standard 9002 and additional requirements of legal metrology, are authorized to certify their products in the framework of the initial verification.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

For legal metrology, see Section 6.2.

In general, certification on the basis of the ISO 9000 series of standards is managed by AFAQ (the French Association for Quality Assurance)

AFAQ
116, avenue Aristide Briand
BP 40
92224 BAGNEUX CEDEX

Telephone: 33-1-46 11 37 37
Fax: 33-1-46 11 37 77

The audits carried out on behalf of the AFAQ are taken into account at the level of legal metrology.

1 Laws of metrology

The European Community Council Directives have been fully incorporated into the regulations of legal metrology:

- Gesetz über das Mess- und Eichwesen (Eichgesetz) (Metrology and Verification Act) new version as of 23 March 1992; amended 21 December 1992,
- Eichordnung (Verification Ordinance), 12 August 1988; amended 21 June 1994,
- Verordnung über Fertigpackungen (Fertigpackungsverordnung) (Prepackage Ordinance) of 8 March 1994; amended 14 June 1994.

2 Legal units of measurement

Only the International System of Units (SI) and a few additional units are permitted for official use and in commercial transactions. Details are given in the following laws and regulations:

- Gesetz über Einheiten im Messwesen (Legal Units Act) of 22 February 1985; amended 22 March 1991,
- Ausführungsverordnung zum Gesetz über Einheiten im Messwesen (Legal Units Execution Ordinance) of 13 December 1985,
- Gesetz über Zeitbestimmung (Time Act) of 25 July 1978.

All the Acts and Ordinances mentioned above as well as their amendments are officially published in the *Bundesgesetzblatt (Federal Law Gazette)*.

The Acts and Ordinances concerning legal metrology including the EC Directives are serially compiled in their up-to-date version in the nonofficial loose-leaf publication:

Das gesetzliche Messwesen

(Compilation of the legal and administrative regulations of legal metrology), published by Arthur Strecker.

A summary of the most important legal regulations concerning legal metrology along with comments is to be found in the brochure.

The above publications can be obtained from:

Deutscher Eichverlag GmbH
Postfach 2649
D-38016 BRAUNSCHWEIG

3 Instruments subject to legal control

3.1 Mandatory verification is prescribed for:

- (a) measuring instruments used in commercial activities to determine
 - the length, area, volume, mass, thermal or electrical energy, thermal or electrical power, volume flow of fluids or gases or density or (mixture) fraction of fluids,
 - the water content of edible fats, the humidity content of cereal grain or oilseed, the bulk density of cereals, the fat content of milk or dairy products or the starch content of potatoes,
 - taxi fares.
- (b) measuring instruments in official dealings and in transport

The measuring instruments referred to under (a) as well as measuring instruments for determining the pressure of fluids or gases and the temperature must be verified if used for:

- measurements within the scope of customs and fiscal law as well as the distilled spirits monopoly law,
- establishing transport charges,
- ship gauging and calibration,
- carrying out public supervisory tasks,
- furnishing expert opinions for public prosecutor or court proceedings, arbitration proceedings or other official purposes,
- furnishing arbitrators' expert opinions,
- official supervision of road traffic,
- checking of the tyre pressure of motor vehicles.

- (c) measuring instruments in the field of the production and examination of medicaments to determine the mass, the volume, the pressure, the temperature, the density or the concentration
- (d) medical measuring instruments with which measurements are carried out in the examination or treatment of humans and animals in the practice of medicine, dentistry or veterinary medicine and medical measuring instruments for personal use such as:
 - measuring instruments for the determination of body temperature with the exception of image-producing instruments,
 - non-invasive sphygmomanometers,
 - haemocytometer dilution pipettes,
 - cell-counting chambers,
 - measuring instruments for determining intraocular pressure (eye tonometers),
 - measuring instruments for determining blood pressure on the eye (ophthalmodynamometers),
 - balances for the determination of body weight in the practice of medicine,
 - high-accuracy weighing machines, fine balances,
 - measuring instruments for determining the density of fluids,
 - therapy level dosimeters for the treatment of patients with photon radiation from outside in the energy range between 0.005 MeV and 3 MeV.
- (e) sound-level meters if used in the field of labour and environmental protection,
- (f) measuring instruments for checking motor vehicles for the content of carbon monoxide in the exhaust gas (CO exhaust gas meters),
- (g) breath analyzers for alcohol,
- (h) radiation protection dosimeters for X- and gamma rays, whose rated range of use falls into the photon energy range of 0.005 MeV to 3 MeV,
- (i) auxiliary measuring devices whose mode of operation is influenced by the appurtenant measuring instrument or which have or can have an effect upon the appurtenant measuring instrument as well as auxiliary measuring devices for establishing a price for direct sale to the public.

3.2 Issue of a declaration of conformity by the manufacturer or the verification authority is prescribed instead of verification for

- (a)
 - measuring flasks, burettes, pipettes, piston-type burettes, piston-type pipettes, dispensers, filling devices, blood sedimentation tubes, syringes with the exception of high-pressure injection syringes,
 - measuring instruments for quantitative investigations of solutions by measurement of the spectral absorbance (absorption photometer) with the exception of instruments for turbidimetry,
 - electrocardiographs in so far as they automatically evaluate Frank and conventional leads,
 - measuring instruments for determining hearing ability (audiometers),
 - image-producing measuring instruments for determining body temperatures (thermographic instruments),
 - pedal-operated ergometers for the defined physical and reproducible stressing of patients.
- (b) dosimeters which are exclusively used for monitoring tests in accordance with section 16, subsection 2 of the X-Ray Ordinance,
- (c) volume measuring instruments for non-fluid products (unloading and loading vessels, mortar containers).

3.3 The technical requirements for the measuring instruments listed above as well as prescriptions for approval and verification, exemptions from mandatory verification, validity of verification, authorized trade containers, state-approved test centres, public weighing machines, maintenance services, official stamps and marks are to be found in the Verification Ordinance (see Section 1.2).

4 Metrological control of quantities

4.1 Products in packages to be marketed on a commercial basis which are packed and closed in the absence of the buyer (prepackages) must comply with the prescriptions of the Prepackage Ordinance. Prepackages are produced by the manufacturer under certain prerequisites and are controlled by the verification authorities (see Section 1.3).

4.2 Authorized containers for the sale of beverages on a commercial basis against payment must be provided with a filling line, the designation of the volume and a manufacturer's mark approved by the PTB.

5 Services responsible for metrology

The tasks of legal metrology are distributed between the federal and the state authorities (see Sections 5.1 and 5.2).

5.1 National service of legal metrology

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
D-38116 BRAUNSCHWEIG

Telephone: 49-531-592-0
Fax: 49-531-592-9292
Telex: 952 822 ptb d

Among other activities, the PTB is responsible for pattern approval of measuring instruments and traceability to national standards of the standards used by the verification authorities.

Publications:

- *PTB-Mitteilungen* (official, scientific journal of the PTB)
- *Jahresbericht* (Annual Report on the activities of the preceding year)
- *Eichordnung* (Verification Ordinance containing technical and legal regulations for the verification of measuring instruments)
- *Eichanweisung* (Verification Instructions - general administrative regulations for the verification of measuring instruments)
- *PTB-Prüfregeln* (Rules for the testing of measuring instruments, description of the testing methods)
- *Technische Richtlinien* (Technical Guidelines - information and recommendations for the officially approved test centres)
- *PTB-Berichte* (PTB-Reports - essays on measuring and testing methods arranged by subjects)
- *PTB-Anforderungen* (PTB-Requirements - accepted rules of technique for the construction and testing of the measuring instruments subject to mandatory verification)

5.2 Local verification services

The verification authorities of the sixteen states (Länder) and the officially approved test centres for measuring instruments (staatlich anerkannte Prüfstellen für Messgeräte) in the fields of electricity, gas, water and heat are responsible for the individual testing of measuring instruments subject to mandatory verification.

The address of the permanent secretariat of the verification authorities is:

Ständiges Sekretariat der AG ME
Hessische Eichdirektion
Holzhofallee 3
D-64283 DARMSTADT

Telephone: 49-6151-125557
Fax: 49-6151-125923

5.3 Laboratories responsible for maintaining national measurement standards

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
D-38116 BRAUNSCHWEIG

The PTB also has an institute in Berlin:

Physikalisch-Technische Bundesanstalt
Abbestrasse 2-12
D-10587 BERLIN

and at:

Fürstenwalder Damm 388
D-12587 BERLIN

The organization of the PTB is described in the brochure *The Physikalisch-Technische Bundesanstalt - A short review*.

Testing and measurement in the Physikalisch-Technische Bundesanstalt are described in the publication *Measurement - Testing - Calibration (Messen-Prüfen-Kalibrieren)*.

Another institution cooperating within the framework of OIML activities, especially in the field of material testing, is:

Bundesanstalt für Materialforschung und -prüfung (BAM)
Unter den Eichen 87
D-12203 BERLIN

5.4 Instrument calibration and evaluation systems

As a rule, pattern evaluations of measuring instruments are carried out by the PTB. For the calibration of measuring instruments there is the German Calibration Service (Deutscher Kalibrierdienst - DKD) the headquarters of which are at the PTB.

In 1994 DKD consisted of 141 laboratories (Kalibrierstellen) which are accredited by the PTB according to EAL (European Accreditation Laboratories Cooperation) criteria, the calibration certificates of which are recognized within the framework of a multilateral European agreement.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The testing laboratories working in the legal metrology field and the quality assurance certification bodies are accredited by the verification authorities. The verification authorities and the PTB do not need an accreditation. The prerequisites and requirements for accreditation are laid down by law. In the field which is not subject to legal control the PTB is an accreditation body for calibration laboratories via the German calibration service (DKD). This calibration service is part of the German accreditation system (DAR), which coordinates the activities of the accreditation bodies both in the field subject to legal control and in that not legally controlled.

6.2 Legal and applied metrological activities in product certification

In legal metrology the manufacturers of nonautomatic weighing instruments (according to EC Directive 90/384/EEC) and the manufacturers of some medical measuring instruments may certify their own products. The prerequisite for such certification is a type approval certificate of the PTB. Accredited test centres for electricity, gas, water and heat meters may carry out the initial verification and the periodical re-verification.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

Product certifications of nonautomatic weighing machines may only be carried out by manufacturers according to EC Directive 90/384/EEC if they have a certified quality management system at their disposal. The QM system must at least comply with ISO 9002 and meet additional product-specific requirements. It may be assumed that these prerequisites must also be fulfilled in the future, if the possibility of product certification by the manufacturer is to be extended to further categories of measuring instrument.

1 Laws of metrology

The following regulations have been issued:

- Presidential Decree 524/78: Weights and Measures,
- Presidential Decree 1153/81: Instruments for measuring the hectolitre mass of cereals,
- Presidential Decree 1154/81: Meters for liquids other than water,
- Presidential Decree 1155/81: Measuring the volume of ships' tanks,
- Presidential Decree 1156/81: Methods of metrological inspection,
- Presidential Decree 1158/81: Cold water meters,
- Presidential Decree 1161/81: Weights,
- Presidential Decree 1162/81: Alcohol metric Tables,
- Presidential Decree 1163/81: Continuous totalizing automatic weighing machines,
- Presidential Decree 1164/81: Hot water meters,
- Presidential Decree 1317/81: Alcoholometers and alcohol hydrometers,
- Presidential Decree 1318/81: Measuring assemblies for liquids other than water fitted with volume meters,
- Presidential Decree 1319/81: Clinical thermometers,
- Presidential Decree 1320/81: Gas meters,
- Presidential Decree 1321/81: Taximeters,
- Presidential Decree 447/83: Checkweighing and weight grading machines,
- Presidential Decree 515/83 and Ministerial Decision F2-503/94: Units of measurement,
- Ministerial Decision F3-1325/87: Tyre pressure gauges for motor vehicles,
- Ministerial Decisions F2-376/93 and F2-1041/94: Nonautomatic weighing instruments.

2 Legal units of measurement

According to Presidential Decree 515/83 and Ministerial Decision F2-503/94, the legal units of measurement are those of the International System of Units.

3 Instruments subject to legal control

All instruments intended for commercial transactions are subject to legal control, specifically:

- weights and simple measures of length and volume,
- nonautomatic weighing instruments, mainly for trade use,
- automatic weighing instruments,
- retail petrol measuring equipment,
- bulk fuel meters,
- taximeters,
- devices measuring directly the volume of cereals.

The legal control of electrical meters and cold water meters is effected by other governmental bodies.

4 Metrological control of quantities

Outside the competence of the legal metrology service, quantity control is executed by other authorities.

5 Services responsible for metrology

5.1 National service of legal metrology

The Department of Metrology of the Ministry of Commerce is responsible for pattern approval of measuring instruments intended for commercial transactions, for the national units of measurement, determination of technical requirements for instruments and staff training. It supplies the regional officers with equipment and working standards.

Ministry of Commerce
Department of Metrology
Canning Square, 101 81 ATHENS

Telephone: 301-3814168
Fax: 301-3842642
Telex: 21 67 35 DRAG GR, 21 52 82 YPEM GR

Publications:

- *Test Methods of Measuring Instruments*, February 1979, (guide for the test methods of measuring instruments subject to pattern approval, available only in Greek).
- *List of approved measuring instruments for commercial transaction*, available only in Greek.

5.2 Local verification services

In each administrative region there is a Division of Weights and Measures which among other duties is responsible for legal metrology and supervises the policy of initial inspection and the statutory annual inspection of trade equipment.

5.3 Laboratories responsible for maintaining national measurement standards

At present the national standards for length, volume, mass and capacity are kept in the Laboratory of Weights and Measures (address above). However, a law has recently been passed to establish a new institute responsible for the national standards, the Hellenic Institute for Metrology.

5.4 Instrument calibration and evaluation systems

At present, a national Calibration Service does not exist. The Department of Metrology can provide calibrations for weights and balances up to medium accuracy. A few private companies are able to provide calibration facilities for other quantities. In addition, the Institute described in Section 5.3 will perform calibrations.

6 Accreditation and certification systems

At present, accreditation and certification systems do not exist.

By the end of 1995, this task will be fulfilled by a Council for Accreditation set up under the same law as the Hellenic Institute for Metrology.

Contact:

Mr G. Frissalakis
Ministry of Industry
80, Michalakopoulou Str.
10192 ATHENS

Telephone: 301-7785295
301-7702780
Fax: 301-7780171

For accreditation according to ISO 9002, the competent body is:

Hellenic Institute of Standardization (EΛOT)
313, Acharon Str.
111 45 ATHENS

Telephone: 301-201 50 25
Fax: 301-20 20 776

1 Laws of metrology

Laws on legal metrology: Act XLV of 1991 and Governmental Decree 127/1991 (X.9) on its execution.

The Verification Rules (Hitelesítési Előírás [HE]) comprising the requirements for individual instruments are published in Hungarian by the National Office of Measures (OMH) in leaflet form.

2 Legal units of measurement

The legal units are those of the International System of Units (SI) and other units specified in Appendix 1 of the above mentioned Act.

The legal units outside the SI are those of Tables 8 and 9 in the BIPM brochure *Le Système International d'Unités* and in addition, for specified fields, the nautical mile, the astronomical unit, the parsec, the light-year, the hectare, the bar (authorized only for expressing pressure of liquids and gases), millimetre of mercury (only for blood pressure), VA, var and the gon.

The prefixes hecto, deca, deci and centi shall only be used in nine specified cases: hl, hPa, dag, dl, dm, cg, cl, cGy and cSv. In accordance with regional tradition, the symbol for decagram may also be dkg.

3 Instruments subject to legal control

For measurements having juridical effect only those measuring instruments shall be used that are verified or calibrated against working standards. The groups of measuring instruments subject to mandatory verification and other instruments subject to regulations are:

- length measures (length measuring machines) and *surface-area measuring instruments,
- volume measuring instruments (including serving measures of glass, measuring containers, storage tanks),
- mass measuring instruments (weights balances),
- hydrometers, continuous densitometers,
- instruments for measurement of hectolitre mass of cereals,
- axle and wheel load measuring instruments for road transport,
- material testing machines (tension, compression, hardness, impact, etc.)
- instruments for measurement of the humidity (moisture content) of grains and of energy-related fluids,
- *viscometers,
- instruments (analyzers) for vehicle exhaust emissions,
- manometers (including those for measuring blood pressure),
- taximeters and chronotachographs,
- flow-meters for volume measurement (water, liquids other than water and gas meters), steam flow meters, water heat meters and measuring systems for custody transfer,
- clinical thermometers,
- measuring transformers,
- electrical energy meters,
- speedometers for traffic control,
- focimeters, (il)luminance meters (luxmeters), *refractometers,
- protection and therapy dosimeters, measuring devices for *activity and radioactive contamination,
- noise-level meters, audiometers,
- gambling machines.

Note: Omission from the list of groups of measuring instruments indicated by an asterisk are under consideration.

No measuring instrument shall be verified without pattern approval delivered by the OMH after pattern evaluation tests.

Manufacturers and instrument-repair organizations are obliged to regularly verify the accuracy of the measuring instruments in use as working standards. Statements of quality and quantity as well as official control measurements made with instruments which are not subject to mandatory verification shall be traceable to measurement standards.

Where there are special conditions of use, the OMH may authorize other organs to perform periodical or post-repair checks on of measuring instruments rather than carry out a verification.

4 Metrological control of quantities

The inspection of prepacked goods comes under the auspices of the General Inspectorate of Consumer Protection.

5 Services responsible for metrology

5.1 National service of legal metrology

The organization bearing national responsibility for inspection and control in the field of legal metrology is the National Office of Measures (OMH).

Országos Mérésügyi Hivatal (OMH)
BUDAPEST, XII,
Németvölgyi út 37-39

Postal address:

PO Box 919
H-1535 BUDAPEST

Telephone: 36-1-156 77 22
Fax: 36-1-155 05 98

The OMH is in particular responsible for:

- preparation of regulations for legal units of measurement,
- maintenance of the national measurement standards and assurance of traceability within the country,
- research and development in the field of legal metrology,
- drafting of legal metrology requirements for certain kinds of measuring instruments,
- authorization and regulation of the metrological activities of other organizations, including accreditation of calibration laboratories,
- verification of measuring instruments and working standards (including reference materials),
- pattern approval of measuring instruments,
- control of the observance of legal metrology regulations,
- representing Hungary in international intergovernmental organizations in the field of metrology.

Publications

- *Mérésügyi Közlemények* (quarterly review containing scientific and technical papers as well as pattern approvals),
- *Hitelesítési Előírás* (Verification Rules).

5.2 Local verification services

Hungary is divided into eight verification districts with regional offices in the following cities:

Budapest, Győr, Szombathely, Pécs, Szeged, Debrecen, Szolnok and Miskolc.

5.3 Laboratories responsible for maintaining national measurement standards

The National Office of Measures (OMH) is responsible for the maintenance of the national measurement standards.

5.4 Instrument calibration and evaluation systems

The Accreditation Committee for Calibration (MAB) which is based at the National Office of Measures (OMH) has accredited over 20 calibration laboratories at the end of 1994 on the base of WECC and NAMAS criteria adopted to Hungarian circumstances.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The integration of existing accreditation systems in Hungary into the National Accreditation Body (NAT) is being considered (and is to be established within the shortest possible time).

Traceability to national, international and/or foreign measurement standards is ensured by the OMH.

6.2 Legal and applied metrological activities in product certification

The accreditation of testing laboratories for product certification is carried out by the Hungarian Office for Standardization (MSZH) with the active cooperation of the OMH on the metrological aspects.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

No information received.

1 Laws of metrology

India is a federal union of states. The constitutional powers are, therefore, distributed between the central and state governments in respect of weights and measures. The establishment of standards of weights and measures is the responsibility of the central government. The enforcement of weights and measures is placed under the concurrent list of the Constitution, and its implementation rests with the state governments. The Indian Parliament has, therefore, enacted two pieces of legislation, namely:

- 1) The Standards of Weights and Measures Act, 1976
- 2) The Standards of Weights and Measures (Enforcement) Act, 1985.

The first Act deals mainly with the establishment of standards of weights and measures in the country and regulates weights and measures involved in the course of interstate trade and commerce. The second Act deals with enforcement of weights and measures laws and regulates weights and measures involved in intrastate trade and commerce.

The following sets of Rules are framed under the Acts for enforcement purposes.

- The Standards of Weights and Measures (National Standards) Rules,
- The Standards of Weights and Measures (Approval of Models) Rules,
- The Standards of Weights and Measures (Interstate Verification and Stamping) Rules,
- The Standards of Weights and Measures (Numeration) Rules,
- The Standards of Weights and Measures (Packaged Commodities) Rules,
- The Standards of Weights and Measures (General) Rules,
- The Indian Institute of Legal Metrology Rules,
- The Standards of Weights and Measures (Enforcement) Rules.

2 Legal units of measurement

India is a signatory of the Convention du Mètre (1875). Based on the above laws, the legal units in force in India are those of the International System of Units (SI). Metric units have been adopted in almost all sectors of the economy.

3 Instruments subject to legal control

At present all weights, measures, weighing and measuring instruments used in commercial transactions are subject to legal control. Measuring instruments used in industrial production and for protection of human health and safety are also covered under the legal ambit of the two Acts. However, their enforcement has been taken up only in certain limited fields.

4 Metrological control of quantities

The Standards of Weights and Measures (Packaged Commodities) Rules regulates prepackaged products. This legislation has been in force since 26 September 1977.

5 Services responsible for metrology

5.1 National service of legal metrology

The authority responsible for legal metrology at the national level is:

Director, Weights and Measures
Ministry of Civil Supplies, Consumer Affairs and Public Distribution
12-A, Jam Nagar House
NEW DELHI 110 011

Telephone: 91-11-389489
91-11-385344
Fax: 91-11-387737
Telegram: Poortisahakar (New Delhi)

The Weights and Measures Unit in the Ministry of Civil Supplies is the nodal authority for planning and coordinating all activities relating to legal metrology in this country. It is responsible for:

- policy matters and legislative proposals,
- coordinating and monitoring the implementation of the law,
- promoting the use of legal units,
- formulation of technical regulations,

- providing consultancy services and cooperation with the OIML and other appropriate international agencies on matters relating to legal metrology,
- examination and approval patterns of measuring instruments,
- preparing manuals of weights and measures and test procedures for uniform adoption throughout the country,
- providing consultancy services and cooperation with the appropriate state and union territory authorities on matters relating to legal metrology and prepacking of articles,
- administering the Regional Reference Laboratories,
- guiding the training programmes implemented in the Indian Institute of Legal Metrology,
- providing guidelines and clarifications to the states in matters of enforcement of weights and measures laws.

5.2 Local verification services

The enforcement of weights and measures laws in India is carried out through machinery created in the individual states. The state enforcement officials are given trained in legal and technical aspects of enforcement at the Indian Institute of Legal Metrology, Ranchi, which is under the administrative control of the Central Ministry.

5.3 Laboratories responsible for maintaining national measurement standards

The National Physical Laboratory of India, New Delhi, is responsible for the realization, establishment, custody, maintenance and up-dating of national measurement standards.

5.4 Instrument calibration and evaluation systems

The establishment of a National Coordination of Testing and Calibration System under the supervision of the Department of Science and Technology and other scientific institutions is in progress. Voluntary calibrations of measuring instruments are also carried out in a number of well-established laboratories distributed throughout the country.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

There is only one law relating to metrology, the Legal Metrology Law No. 2, 1981, the basis of legal metrology activities. This law replaces the Verification Law No. 175, 1949, which no longer conforms to present conditions. Measures against criminal activities in weights and measures also include the Criminal Law, articles 255, 258 and 259.

To implement the Legal Metrology Law the following Government Decrees were issued:

- No. 2, 1985, concerning Measuring Instruments subject to verification,
- No. 10, 1987, concerning Legal Units of Measurement,
- No. 7, 1989, concerning the National Standardization Council,
- No. 2, 1989, concerning the National Standards for Measurement Units.

2 Legal units of measurement

Based on the Legal Metrology Law, legal units which apply are those of the International System of Units (SI). Government Decree No. 10, 1987, regulates and specifies the SI units into:

- basic units
- derived units
- supplementary units and
- other units outside SI units which are approved and used along with SI units.

3 Instruments subject to legal control

Measuring instruments used in:

- the public domain,
- custody transfer,
- determination of yield and wage,
- trade or business transactions,
- determination of factory final product,
- enforcement of regulations,

are subject to legal control. This covers measuring instruments for: mass, length, volume, moisture, force, pressure, electrical power, taximeters and its standards.

4 Metrological control of quantities

The Legal Metrology Law of 1981 includes packaging regulations.

Prepacked goods/products that are produced and sold to the public are subject to legal metrology regulations to guarantee that mass, volume or total content are correct.

5 Services responsible for metrology

The National Standardization Council has established a National Standardization System, according to which there are three services (institutes) responsible for:

- the Legal Metrology Service,
- the Technical/Science Metrology Service (under the Indonesian Institute of Sciences),
- the Nuclear Radiation Metrology Service (under the National Atomic Energy Board).

5.1 National service of legal metrology

In accordance with the Legal Metrology Law No. 2, 1981, the Trade Minister is responsible for the implementation of legal metrology.

The service (institute) of the Ministry of Trade which is responsible for legal metrology activities at national level is:

Directorate of Metrology
Jalan Pasteur No. 27
40171 BANDUNG

Telephone: 62-22-443597
62-22-430609
Fax: 62-2-4207035
Telex: 28176 BD

The main tasks of the Directorate of Metrology are:

- to manage physical reference standards (mass and length),
- to draw up technical regulations for measuring instruments,
- to recruit, educate and train metrology officials (metrology engineers and legal metrology technicians),
- to carry out type evaluation and to issue type approvals for measuring instruments to be imported or produced,
- to implement relations with the OIML.

Thirty-five engineers and scientists and technical officers are involved in testing and type approval at the Directorate of Metrology. There are 364 Province and Sub-province trade measurement inspectors.

5.2 Local verification services

There are fifty-five Local Verification Services throughout Indonesia. Their main tasks are:

- to manage physical reference standards (mass and length),
- to verify measuring instruments and control reliability of mass, volume or total content of prepacked goods,
- to investigate contraventions of the Legal Metrology Law.

5.3 Laboratories responsible for maintaining national measurement standards

The National Standardization Council has appointed two metrology institutional laboratories as national laboratories having custody of national measurement standards. They are:

- the Directorate of Metrology, for national standard of mass (kilogram prototype K 46),
- the Research and Development Centre for Calibration, Instrumentation and Metrology at the Indonesian Institute of Sciences, for national standards of length, temperature, time, electric current and light.

5.4 Instrument calibration and evaluation systems

In accordance with the National Standardization System, the calibration of measuring instruments which are not subject to legal metrology control are carried out by the Calibration Centre that is accredited by the National Standardization Council to calibrate measuring instruments of given quantities. The Calibration Centres unite in the National Calibration Network.

The procedure and requirements for obtaining accreditation are regulated by the National Standardization System.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

There are two principal methods of disseminating standards of measurement which are traceable to the Indonesian Primary Standards. The first method is through the National Accreditation Board (KAN) which is concerned with measurement of a scientific and technical nature; the second is through the regional office of the Directorate of Metrology.

The National Standardization Council has not yet defined a hierarchy of standards for each of the legally defined units.

6.2 Legal and applied metrological activities in product certification

No information received.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

Indonesia has adopted the ISO 9000 series of standards in their entirety as the national quality standards. The series was published in Indonesia as SNI 19-9000 in 1991. Quality certification to ISO 9000 is provided by the KAN. There are currently two organizations accredited under this scheme.

1 Laws of metrology

The laws of metrology are contained in seven Weights and Measures Acts dating from 1878 to 1936 and various sections in ten other Acts.

The Packaged Goods (Quantity Control) Act was issued in 1980.

Statutory Regulations made under the Weights and Measures Acts governing the verification and stamping of measuring instruments in use for trade have been enacted as have Regulations under the Packaged Goods (Quantity Control) Act, 1980. EC Directives on measuring instruments have also been implemented by means of Statutory Regulations under the European Communities Act 1972.

Copies of Acts and Regulations may be obtained from:

Government Publications Office
Sun Alliance Building
Molesworth Street
DUBLIN 2

2 Legal units of measurement

The legal units of measurement are those permitted under Council Directive 80/181/EEC of 20 December 1979 as amended by Council Directive 89/617/EEC of 27 November 1989. In addition to designating the International System of Units (SI) as the legal system of units, the Directives permit, for limited periods, the continued use of some units of the avoirdupois system.

3 Instruments subject to legal control

All weights, measures, weighing and measuring instruments used for trade.

4 Metrological control of quantities

The Packaged Goods (Quantity Control) Act, 1980, implements the "average system" of quantity control based on European Council Directives 75/106/EEC and 76/211/EEC as amended, on prepackaged products. Products not packaged in accordance with the "average system" are subject to metrological control under the Restrictive Practices (Amendment) Act 1987.

5 Services responsible for metrology

5.1 National service of legal metrology

National Office of Weights and Measures
Department of Enterprise and Employment
Frederick Building
South Frederick Street
DUBLIN 2

Telephone: 353-1-661 44 44
Fax: 353-1-671 74 57
Telex: 93478

The department is responsible for the administration of the Weights and Measures legislation including the general direction of the work of local verification officers. It is responsible for pattern approval of new designs of metrological instruments and oversees testing by the National Metrology Laboratory (FORBAIRT) for that purpose. The traceability of standards used by the Inspectorates must also be maintained.

5.2 Local verification services

The verification and inspection of measuring instruments used in trade is conducted:

- (a) by Inspectors of the Weights and Measures Office of Dublin and Dun Laoghaire Corporations,
- (b) by members of the Garda Siochana (police force) acting as ex-officio Weights and Measures Inspectors
- (c) by the gas meter inspectorates attached to Dublin and Cork City Corporations, who are responsible for the verification of gas meters.

5.3 Laboratories responsible for maintaining national measurement standards

(a) National Office of Weights and Measures
Department of Enterprise and Employment
DUBLIN 2

(b) National Metrology Laboratory
FORBAIRT
Glasnevin
DUBLIN 9

Telephone: 353-1-8370 101

Fax: 353-1-8368 364

5.4 Instrument calibration and evaluation systems

Calibration or evaluation of instruments not subject to legal control is carried out by the National Metrology Laboratory (Forbairt) and by a number of private laboratories which have been accredited under the Irish Laboratory Accreditation Scheme.

6 Accreditation and certification systems

No information received.

ISRAEL

Surface area: 21 950 km²
Population: 5 190 000

The organisation of the legal metrology service in Israel in 1970 is described in the following paper:

The Weights and Measures Service of the State of Israel published in OIML Bulletin No. 38 (March 1970) pp. 12–24.

Address of the service:

Weights, Measures and Standards
Ministry of Industry and Trade
POB 299
JERUSALEM 91002

Telephone: 972-2-220 220
972-2-220 218
Fax: 972-2-245 110

1 Laws of metrology

- Royal decree of 23 August 1890 No. 7088: single text on metrology approving the table of units of measurement and making metrological verification compulsory (See translation into French in OIML Bulletin No. 13, p. 23–30, 1963).
- Law of 7 July 1910 on the adoption of the metric carat.
- Royal decree of 31 January 1909 No. 242 approving the regulation on the metrological service.
- Royal decree of 12 June 1902 No. 226 approving the regulation for the manufacture of weights, measures and weighing and measuring instruments.
- Ministerial decree of 14 July 1902 No. 9855 approving the technical instructions concerned by the regulations.

The above-mentioned main law has been amended in successive steps, the following may be mentioned in particular:

- Decree of the President of the Republic of 12 November 1958 No. 1215.
- Royal decree of 9 January 1939 No. 206 on the creation of the Comitato Centrale Metrico, a consultative technical organ of the metrology service.

2 Legal units of measurement

The legal system of units is the SI system.

The legal units (SI) shall be used in the economic activities, in the field of health and public safety and in operations of administrative nature. The requirements of the law apply to measuring instruments used, to measurements made and to values of quantities expressed in units of measurement.

3 Instruments subject to legal control

- all instruments for weighing and measurement of volume and length,
- instruments used for prepackaging,
- gas meters,
- instruments for the measurement of the hectolitre mass of grain,
- chronotachographs,
- all other instruments for which there is an EC Directive.

4 Metrological control of quantities

Prepackages are subject to metrological control in accordance with the harmonized EC requirements.

5 Services responsible for metrology

5.1 National service of legal metrology

The metrological unit of the Ministry of Industry, Commerce and Crafts is responsible for the maintenance of permanent conformity of weighing and measuring instruments with the requirements of laws and regulations.

Ministero Industria e Commercio
Ufficio Centrale Metrico
Via A. Bosio, 15
00161 ROMA

Telephone: 39-6-841 68 25
Fax: 39-6-841 41 94

Central organs:

General administration for internal trade and industrial consumption

Division XI: Administrative and juridical matters and coordination of the peripheral units

Division XII: Ufficio Centrale Metrico, via Antonio Bosio 15, 00161 ROMA

- Preservation of the national standards for mass and length assigned to Italy by CGPM on 26 September 1889
- Preservation of the metric secondary standards of 2nd and 3rd order

(*) Information collected in 1985. See also WELMEC Directory, 1995

- Quinquennial verification of the prototypes with the standards of the provincial offices
- Theoretical and practical training in metrology and the metric service for inspector trainees
- Verification of pressure gauge standards used by experts
- Technical examination and pattern approval of measuring instruments.

5.2 Local verification services

There are 20 districts of metrological inspection which have their headquarters located in the administrative centres of the regions.

There are 95 provincial verification bureaux with headquarters in each province.

The verification takes place by use of temporary bureaux in each municipality once every two years.

5.3 Laboratories responsible for maintaining national measurement standards

In addition to those maintained at the central metrology office (Ufficio Centrale Metrico) of the Ministry of Industry, Commerce and Crafts, the national standards for the basic units of measurement are distributed between the following institutions:

IMGC - Istituto di Metrologia G. Colonnetti del Consiglio Nazionale delle Ricerche (CNR)
Strada delle Cacce 73, 10135 TORINO

IEC - Istituto Elettrotecnico Nazionale Galileo Ferraris
Strada delle Cacce 91, 10135 TORINO

ENEA - Laboratorio di metrologia delle radiazioni ionizzanti ENEA-CRE Casaccia
C.P. 2400, 00100 ROMA A.D.

ISS - Istituto Superiore di Sanita
Laboratorio di Fisica, Reparto di fisica biomedica
Viale Regina Elena 299, 00161 ROMA

5.4 Instrument calibration and evaluation systems

On 31 December 1981 there were 16 accredited calibration centres in the field of electrical and mechanical-thermal metrology.

Information about this system (SIT-Servizio di Taratura in Italia) can be obtained from Istituto di Metrologia G. Colonnetti, see address in point 5.3 above.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

In Japan, a modern legal metrology system was initially established with the enactment of the Law of Weights and Measures in 1891. The legal units for measurement were unified into the metric system in 1921. This law was revised into the 1951 Measurement Law. In 1992 the law and related regulations were significantly revised and became effective in 1993 in order to correspond to new social needs, i.e. internationalization, technological innovation and deregulation. The Measurement Law is supplemented by Cabinet Orders and Ministerial Orders.

2 Legal units of measurement

The new Measurement Law is based on the International System of Units (SI) with limited exceptions for some particular cases, e.g. pound/yardage system for the aerospace field.

3 Instruments subject to legal control

The Measurement Law stipulates conditions (see Sections 3.1 and 3.2) concerning the use and supply of certain measuring instruments (referred to as "specified measuring instruments") in order to ensure accurate metrology. Containers for specified commodities are also subject to control (Section 4).

3.1 Specified measuring instruments for trade

Measuring instruments for trade purposes shall not be used unless

(a) their design and structure satisfies the pattern requirements and (b) each individual instrument meets the accuracy requirements.

Specified measuring instruments subject to the above control are as follows:

- taximeter,
- nonautomatic weighing instrument, weight,
- liquid-in-glass thermometer,
- clinical thermometer,
- leather area meter,
- water meter,
- hot-water meter,
- fuel-oil meter,
- LPG meter,
- gas meter,
- road tanker,
- density hydrometer,
- pressure gauge,
- blood pressure gauge,
- calorimeter,
- heat meter,
- maximum demand power meter,
- watt-hour meter,
- reactive watt-hour meter,
- illuminometer,
- sound-level meter,
- vibration-level meter,
- concentration meter,
- specific gravity hydrometer.

The Measurement Law also requires the manufacturers, repairers and retailers of specified measuring instruments to notify the local weights and measures institutes. (This notification requirement has replaced the registration requirement in the old law).

3.2 Specified measuring instruments for household use

There is a separate control for specified measuring instruments used mainly for general household purposes (even though not used for trade or certification). Manufacturers of such instruments are obliged to comply with certain technical requirements. Kitchen scales, bathroom scales and baby scales are subject to this control.

4 Metrological control of quantities

Special containers are allowed for trade use which are filled with specified commodities up to a certain level. The manufactures of the containers must be designated by the Ministry of International Trade and Industry (MITI) as technically proficient and the types of container must be stipulated by Ministerial Order. Foreign test data issued by MITI-approved laboratories are acceptable.

5 Services responsible for metrology

5.1 National service of legal metrology

5.1.1 Structure of metrological control authorities

(a) Weights and Measures Office, MITI

The Weight and Measures Office of the Machinery and Information Industries Bureau, MITI, is in charge of the legal aspects of implementation of the Measurement Law and basic planning for metrology regulation in Japan.

Weights and Measures Office
Machinery and Information Industries Bureau, MITI
1-3-1 Kasumigaseki, Chiyoda-Ku
TOKYO 100

Telephone: 81-3-3501-1688
Fax: 81-3-3580-2768

(b) Agency of Industrial Science and Technology (AIST), MITI

This agency consists of a secretariat and fifteen research laboratories. The National Research Laboratory of Metrology (NRLM), the Electrotechnical Laboratory (ETL), and the National Institute for Resources and Environment (NIRE) are in charge of the pattern approval of measuring instruments and the inspection of verification standards. The National Institute for Materials and Chemical Research (NIMCR) is in charge of reference materials.

(c) International Trade and Industry Inspection Institute (ITIII), MITI

The ITIII has two basic functions from the metrological point of view. First, the Institute acts as secretariat for the calibration laboratory accreditation system and designated manufacturer system (see Section 5.2). Officers also work as assessors in the accreditation process. Second, this institute maintains some certified reference materials.

International Trade and Industry Inspection Institute
2-49-10 Nishihara, Shibuya-Ku
TOKYO 151

Telephone: 81-3-3481 1921
Fax: 81-3-3481 1920

(d) Japan Electric Meters Inspection Corporation (JEMIC)

The JEMIC, a non-profit institution established by special law, is responsible for the verification of electricity meters.

5.1.2 Pattern approval

(a) Legal and technical requirements for pattern approval

The MITI has the responsibility to ensure that the design of a specified measuring instrument meets certain criteria to guarantee accurate measurement. The Minister fulfils this responsibility by examining the designs of measuring instruments and testing sample instruments.

Once the pattern of an instrument has been approved, the MITI issues a certificate of approval, and subsequent production instruments made to the pattern must be marked with an assigned type number. The marking and numbering on a production instrument is the primary indication to the prefectural and other verification institutes that the measuring instrument is of an approved pattern.

Pattern approval is required for all the specified measuring instruments listed in Section 3.1, regardless of type. Notified manufacturers, importers and foreign manufacturers can apply the pattern approval test.

(b) Execution of pattern approval tests

Pattern approval authority is delegated to the NRLM, ETL, NIRE and JEMIC. These four institutes carry out the pattern examination according to the type of instrument.

5.2 Local verification services

(a) Local verification organizations

In order to carry out the objectives of the Measurement Law uniformly throughout Japan, there are forty-seven prefectural verification institutes of weights and measures and eighty-five municipal inspection institutes of weights and measures.

The main functions of prefectural institutes are to verify legally specified measuring instruments used for trade, to register manufacturers, retailers and repairers of measuring instruments, to inspect weighing instruments periodically, and so on. The main functions of municipal institutes are to inspect weighing instruments periodically and to inspect packaging commodities.

(b) Verification

Article 16 of the new Measurement Law states that specified measuring instruments shall be used or owned for the purpose of measurement in a trade or certification only if they have or bear a valid verification mark. A valid verification mark is affixed when an instrument satisfies the type requirements (usually checked by type approval marking) and accuracy requirements stipulated in a Ministerial Order. Verifications are carried out by local institutes, by the JEMIC and by the other designated verification institutes according to instrument type.

(c) Designated manufacturer

When a manufacturer of specified measuring instruments is designated by the MITI as having an excellent quality system and inspection facilities, it may deliver its products after self-inspection, which replaces official initial verification. This designated manufacturer must also keep inspection records for three years for consequent audit by the local verification institute. The requirement for this designation is stipulated in a Ministerial Order, which is basically identical to ISO 9002. Instruments manufactured by such designated manufacturers are nevertheless subject to periodic inspection or reverification by the prefectural institutes and designated calibration organizations.

(d) Reverification

A Cabinet Order specifies duration of the validity of a verification mark for certain measuring instruments. In such cases, reverifications will be carried out after required repairs. The following examples of such instruments are indicated with their validity periods.

- water meter 8 years
- gas meter 10 years
- watt-hour meter 7 years

In addition, the taximeter is subject to reverification after a one year interval. Test items for reverification are identical to the initial verification.

(e) Periodical inspection

Periodical inspection is a simplified version of reverification. Test items for periodical inspection are listed below. The maximum permissible error for periodical inspection is basically twice as large as that for verification.

- weighing instrument 2 years
- hide and skin planimeter 1 year

5.3 Laboratories responsible for maintaining national measurement standards

(a) National Research Laboratory of Metrology (NRLM)

The NRLM maintains such primary standards as length, mass, temperature, density, viscosity, humidity, atomic time and frequency, force, hardness and vibration.

National Research Laboratory of Metrology
1-4, Umezono 1-Chome, Tsukuba
IBARAKI 305

Telephone: 81-298-54 41 49
Fax: 81-298-54 41 35

(b) Electrotechnical Laboratory (ETL)

The ETL maintains such primary standards as electric current, electric resistance, voltage and illuminance.

Electrotechnical Laboratory
1-1-4, Umezono, Tsukuba
IBARAKI 305

Telephone: 81-298-54 50 06
Fax: 81-298-58 53 45

(c) National Institute for Materials and Chemical Research (NIMCR)

The NIMCR controls reference materials in the chemical field and related technology.

National Institute for Materials and Chemical Research
1-1, Higashi, Tsukuba
IBARAKI 305

Telephone: 81-298-54 44 11
Fax: 81-298-54 46 39

(d) National Institute for Resources and Environment (NIRE)

The NIRE controls heat-quantity standard (benzoic acid).

National Institute for Resources and Environment
16-3, Onogawa, Tsukuba
IBARAKI 305

Telephone: 81-298-58 81 03
Fax: 81-298-58 82 08

5.4 Instrument calibration and evaluation systems

Verification standards used for verification/inspection purposes must periodically check traceability to the national measurement standards. Instrument calibration services for such verification standards are provided, according to the type of standard, by the NRLM, ETL, JEMIC and prefectural verification institutes to those institutes or businesses related to regulation.

Calibration services for the private sector not necessarily related to regulation are provided by the calibration laboratory accreditation system stipulated in the new Measurement Law. This accreditation system is referred to as the Japan Calibration Service System (JCSS).

6 Accreditation and certification systems

(a) Calibration laboratory accreditation system

A calibration laboratory accreditation system was established by the new Measurement Law. An accredited calibration laboratory is allowed to provide a calibration certificate marked with JCSS when the laboratory has calibrated a measuring instrument of a general user by its secondary standard traceable to the national primary standards.

The law specifies that the requirements for accreditation are

- to have secondary standards traceable to the national primary standards,
- to have enough technical proficiency to carry out calibration activities precisely and smoothly,
- to maintain quality systems with adequate procedural standards for calibration.

Details of the requirements are duplicated from the ISO Guide 25.

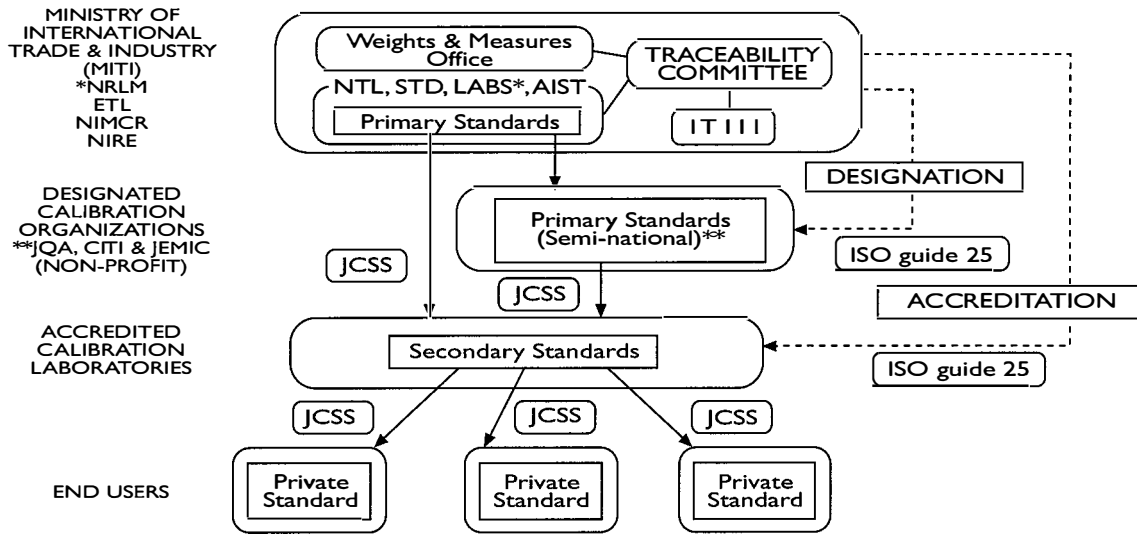
The law also stipulates a designated calibration organization which provides secondary national standards to the accredited laboratories. This two-tier system was established to reduce the increasing number of calibration requests to the national laboratories. The JEMIC plays the same role in the electricity standard field. The Japan Quality Assurance Institute (JQA) has been designated to calibrate length, high frequency power, laser power beam and benzoic acid, while the Chemical Inspection and Testing Institute, Japan (CITI) has been designated to provide reference materials.

The logo JCSS stands for the Japan Calibration Service System. The first letter of the logo issued by the accredited laboratories is a capital "J" (see above), while that issued by the national primary standard laboratories or designated calibration institutes is a small "j".

(b) Quality system accreditation system

The Japan Accreditation Board for Quality System (JAB) is the body responsible for the accreditation system in Japan. This is a voluntary scheme and therefore there is no formal link with the legal metrology area.

The following chart describes the whole accreditation scheme.



The Committee for Standardization, Metrology and Certification at the Cabinet of Ministers of the Republic of Kazakhstan (Gosstandart of Kazakhstan) is the State Body on standardization, metrology and certification which ensures the realization of the uniform policy in the above fields.

Gosstandart of Kazakhstan is responsible for:

- development of main trends in standardization, metrology and certification,
- approval of state documented standards,
- establishment of measurement standards (etalons),
- type approvals and verification of measuring instruments,
- formation of structures in charge of standardization, metrology, certification.

There are four basic functional departments within the structure of Gosstandart of Kazakhstan:

- Legal metrology,
- State system of standardization,
- Certification of products and quality systems,
- State supervision in respect of the use of documented standards and technical specifications.

Gosstandart of Kazakhstan realizes its functions via 19 regional centres of standardization and metrology.

Gosstandart of Kazakhstan co-operates with the State Committees, Ministries, and Departments of Kazakhstan, including:

- Ministry of industry,
- Ministry of communications,
- Ministry of agriculture,
- Ministry of science and new technologies,
- Ministry of geology and protection of bowels of the earth,
- Ministry of health protection,
- Ministry of ecology and bio-resources,
- Ministry of energetics and fuel resources,
- Academy of engineering, etc.

Gosstandart of Kazakhstan represents the State on behalf of the Government in international and regional organizations and in cooperation with foreign national organizations in the fields of standardization, metrology, and certification.

Contact:

The President of Gosstandart of Kazakhstan
83, prospect I. Altinsarina
ALMATI 480035

Telephone: 7-327-21 08 08
Fax: 7-327-28 68 22

1 Laws of metrology

In the Republic of Kenya laws of metrology are issued and implemented by the central government and not by local authorities. The Department of Weights and Measures of the Ministry of Commerce is responsible for the enforcement of the laws of metrology.

- The Weights and Measures Act, Chapter 513, Law of Kenya, is the principal Act that controls weighing and measuring in Kenya. Various Rules have also been made under this Act for the better implementation of the Act. These Rules are:
- Weights and Measures (General) Rules,
- Weights and Measures (Sale of Bread) Rules,
- Weights and Measures (Sale and Labelling of Goods) Rules.

2 Legal units of measurement

The legal units of measurement are those of the International System of Units (SI).

3 Instruments subject to legal control

All weights, measures, weighing and measuring instruments used in commercial transactions or industrial production including instruments used in collection of tolls or duties and any instrument made available in Kenya for use by the public, whether on payment or otherwise.

4 Metrological control of quantities

The Weights and Measures Act and the Weights and Measures (Sale and Labelling of Goods) Rules have provisions for the control of both prepackaged and non-prepackaged goods. In the case of prepackaged goods the control involves:

- specifying standard quantities for particular commodities,
- specifying the types of containers used for packing various commodities,
- specifying the manner of marking the prepackaged commodities and other information to be carried on the packages.

In the case of non-prepackaged goods the Act and Rules control the sale of such goods by weight, volume, number, size and grade.

5 Services responsible for metrology

5.1 National service of legal metrology

The main authority for legal metrology in Kenya is:

Weights and Measures Department
Ministry of Commerce and Industry
P.O. Box 41071
NAIROBI

Telephone: 254-2-50 46 64
254-2-50 46 65
254-2-50 46 84
Fax: 254-2-21 88 45

The metrology service covers:

- approval of patterns for all instruments intended for use in trade,
- acquisition and maintenance of Kenya Primary Standards and copies thereof,
- initial verification and reverification of trade equipment to ensure that it conforms to the metrology regulations,
- supervision and control of the manufacture, sale and repair of weights, measures, weighing and measuring instruments.

5.2 Local verification services

Kenya is divided into eight major administrative regions known as Provinces. Each province is further divided into smaller regions known as Districts.

Each Provincial Headquarters has a Provincial Weights and Measures Office from where metrology control services cover to districts and their divisions. District Weights and Measures Offices have been established in some districts and the exercise will continue until each of the forty-two districts has its own office.

These Provincial and District Offices are charged with the inspection and verification of weighing and measuring instruments in use for trade in their areas of operation.

5.3 Laboratories responsible for maintaining national measurement standards

The National Weights and Measures Laboratory in Nairobi is the custodian of the Kenya Primary Standards and Secondary Standards.

Secondary reference standards and working standards are in the custody of the Provincial and District Offices, respectively.

5.4 Instrument calibration and evaluation systems

This metrological service is mainly carried out by the National Weights and Measures Laboratory. However, some calibration and evaluation work is done at the provincial and district laboratories depending on the classes of instruments to be calibrated.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

- On strengthening of the metrological activities,
Decree of the President of the DPR of Korea of 12 February 1980, No. 20,
- Law on metrology of DPR of Korea (3 February 1993),
- Regulations on metrology,
Decree of the Council of Administration of DPR of Korea (16 November 1993, No. 74),
- Regulations on metrology,
Decree of the National Committee for Science and Technology of 28 February 1994, No. 12.

There are currently 150 regulations on metrological verification and 70 national standards to ensure the legal verification, calibration, pattern approval and inspection of measuring instruments.

2 Legal units of measurement

The legal system of units of measurement is that of the International System of Units (SI); other units are specified in national standards.

The SI units have been applied as legal units of measurement in all fields from 14 April 1975 in accordance with national standard 4077-75. This standard was replaced in 1991 by national standard 4077-91, Units of measurement.

3 Instruments subject to legal control

- standards and standard measuring instruments reproducing the legal units of measurement,
- measuring instruments used for trade,
- measuring instruments used for scientific research, tests and analysis,
- measuring instruments used in production processes and for control of product quality,
- measuring instruments used in health care, human safety and environmental protection.

4 Metrological control of quantities

The metrological control of prepackaged products is outside the authority of metrological control institutions and comes under the auspices of quality control authorities.

5 Services responsible for metrology**5.1 National service of legal metrology**

Committee for Standardisation of the DPR of Korea
Zung Gu Yok
PYONGYANG

Telephone: 850-2-333-74 28
Telex: 5972 TECH KP

Central Institute of Quality and Metrology (CIQM)
Sadong District
PYONGYANG

The responsibilities of these authorities are:

- custody of national standards to reproduce and maintain the legal units of measurement and research related to their development,
- calibration of high precision reference standards maintained by local verification offices (provincial verification offices) and other bodies of the national economy,
- studies related to regulations of metrology, verification methods and other technical requirements,
- tests and approval of patterns of measuring instruments,
- supervision of how metrological bodies observe the law and regulations, technical assistance to them.

5.2 Local verification services

- Regional verification services
Every province has its own verification service, responsible for the verification of measuring standards used by city and county verification offices and by large factories of the province and for technical administration in the field of legal metrology.

- City and county verification offices
These are responsible for verification of measuring instruments belonging to legal metrology services in rural areas, in trade and in comparatively small factories.

5.3 Laboratories responsible for maintaining national measurement standards

The Central Institute of Quality and Metrology has the custody of standards reproducing the legal units of measurement.

5.4 Instrument calibration and evaluation systems

Measuring instruments subject to legal control must be submitted for calibration (or for verification).

The Central Institute of Quality and Metrology and the local verification offices are responsible for the calibration and evaluation of instruments.

The verification certificates issued on the basis of evaluation by the CIQM and by the local verification services constitute legally valid official documents.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

The principal Act concerning legal metrology is the Weights and Measures Act (1961), which was entirely revised in 1992 and became effective in 1993 in order to correspond to new social needs, i.e. internationalization, etc. The Act with the Presidential Decree and Enforcement Regulations specifies Korea's legal units of measurement of physical quantities, and requires that measurements made for any legal purpose are traceable to Korean primary standards.

1.1 Legal requirement for traceability

The Weights and Measures Act requires that the measurement of physical quantity for legal purposes be made by means of, reference to, comparison with, or derived from, specified standards of measurement including certified reference materials.

2 Legal units of measurement

The legal units of measurement within Korea are defined in the Presidential Decree of the Act and are those of the International System of Units (SI). The unification of all measuring units into the metric system excluding the fields of land and building, was begun in 1964, and the SI units have constituted the legal units since 1st January 1983, including the fields of land and building with limited exceptions for some particular cases as below:

- measurements in relation with exports and imports,
- measurements on ships,
- measurements on aircraft,
- measurements in relation to weaponry,
- measurements in relation to scientific research.

3 Instruments subject to legal control

Under the Weights and Measures Act, measuring instruments are divided into two categories. First, measuring instruments for use in trade or certification which comprise 134 items as prescribed by the Presidential Decree. Second, measuring instruments for use in measurement other than trade or certification. Both categories cover machines, appliances or devices for measurement of the quantity of the state of physical phenomena.

4 Metrological control of quantities

The Weights and Measures Act and the Presidential Decree specify prepackaged consumer goods whose accuracy and marking must conform to packaging control. Imported goods are also subject to this control.

5 Services responsible for metrology

5.1 National service of legal metrology

The Industrial Advancement Administration (IAA)
Ministry of Trade, Industry and Energy
2, Chungang-Dong,
Kwachon-city, KYUNGGI-DO 427-010

Telephone: 82-2-503 79 35
Fax: 82-2-502 41 07

The IAA is responsible for completing the metric system in Korea, the establishment and coordination of metrological policy on all aspects of the National Measurement System, the maintenance and dissemination of the physical standards of measurement for all the Korean legal units of measurement through the Korea Research Institute of Standards and Science (KRISS) and the supervision (or guidance) over its subordinate organizations on matters relating to legal metrology and the use of legal units of measurement.

This body is directly responsible for OIML activities in Korea and also provides Korean representation at the Conférence Générale des Poids et Mesures.

5.2 Local verification services

There are two types of verification for the measuring instruments prescribed by the Presidential Decree, i.e. verification after manufacturing and importing, and verification after repairing and expiration of the verification validity period.

At present, three institutes for verification after manufacturing and importing are designated as specialized verification institutes, the Korea Machinery Meter and Petrochemical Testing & Research Institute (MPI) including three local institutes, the National Industrial Technical Institute (NITI) including nine local industrial technology institutes, and the KRISS for verification of only normal watt-hour meters.

The authority for verification after repairing and expiration of the verification validity period has been delegated to mayors of fifteen local governments. The validity periods for certain measuring instruments are specified by Ordinance of the Ministry. The following main examples of such instruments are indicated with their duration periods.

- taximeter: 1 year
- gas meter: 5 years
- water meter: 6 years
- oil meter: 5 years
- liquid petroleum gas meter: 2 years

5.3 Laboratories responsible for maintaining national measurement standards

The custodian of national standards of measurement is:

Korea Research Institute of Standards and Science (KRISS)
P.O. Box 102, Yuseong
TAEJON, 305-600

Telephone: 82-42-861 72 00
Fax: 82-42-868 55 55

The major functions and roles of the KRISS are as follows:

- to establish, maintain and disseminate the national measurement standards through systematic calibration,
- to conduct research and development in the fields of measurement science and precision technology,
- to provide education and training in measurement standards, etc.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The Korea Laboratory Accreditation Scheme (KOLAS), operating within the framework of the IAA, is the leading national institution responsible for the accreditation laboratories in Korea. The IAA acts as the Accreditation Body in Korea. Currently, eleven organizations have been accredited by the IAA (1994). The KOLAS represents Korea at the International Laboratory Accreditation Conference (ILAC).

A nation-wide calibration network has been established since 1978 under the supervision of the IAA, comprising one national standard research laboratory (KRISS), 86 calibration laboratories and 248 in-house calibration laboratories in 1994. The functions of each authorized calibration organization are as follows:

- the KRISS maintains the national measurement standards and disseminates the standards to calibration laboratories,
- calibration laboratories disseminate the measurement standards to industries,
- in-house calibration laboratories disseminate the measurement standards to their own measuring instruments.

Therefore, there are three principal methods of disseminating measurement standards which are traceable to the Korean primary standards in Korea.

The first method is through the KRISS, which is concerned primarily with measurements of a scientific or technical nature; the second method is through the designation of the calibration laboratories, which provide calibration services and issue calibration certificates to organizations, and the third method is through the in-house calibration laboratories, which are only permitted to issue certificates for their own instruments.

The KRISS also provides services directly to industries in fields of measurement in which their calibration laboratories do not have capabilities.

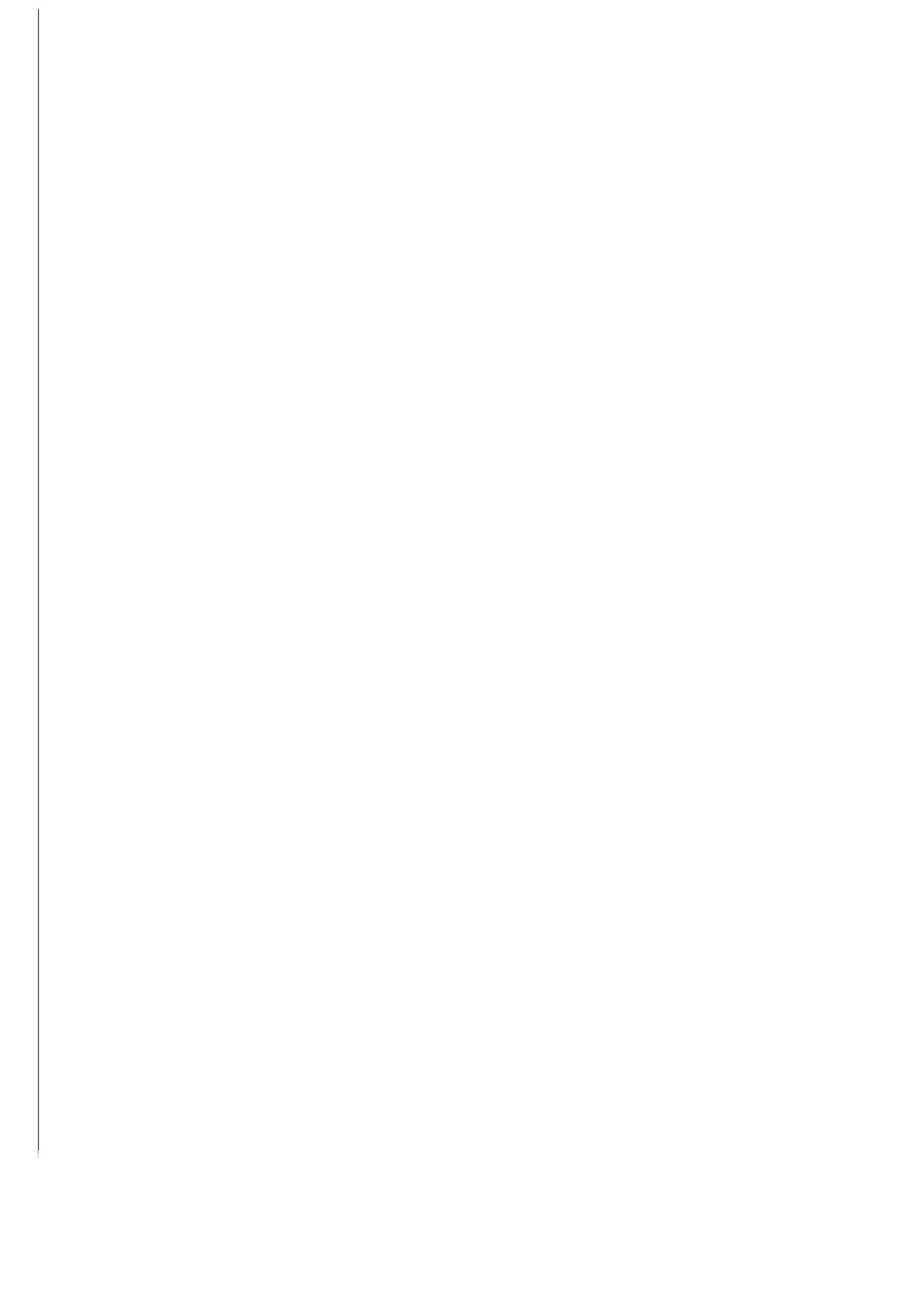
Since the legal requirements vary depending on the accuracy required, a hierarchy of standards has been developed which enables a range of accuracies to be disseminated throughout the country.

6.2 Legal and applied metrological activities in product certification

The KS (Korean Industrial Standards) Mark Scheme is operated by the IAA. When the applicant company's quality system complies with the assessment criteria, and the quality of the product conforms to relevant Korean Industrial Standards, the company is granted the right to use the mark.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

Korea adopted the ISO 9000 series as Korean Industrial Standards in 1992 as the KSA 9000 series.



1 Laws of metrology

The metrology regulations still valid in Monaco are:

- Ordonnance of 31 May 1854 establishing the decimal metric system in the Principality of Monaco,
- Ministerial Decree of 8 May 1941 concerning weighing of sold goods.

See also Section 3 as regards the municipal regulations.

2 Legal units of measurement

The International System of Units (see Section 1).

3 Instruments subject to legal control

A municipal regulation is published every uneven second year concerning the organization of verification sessions (by authorized enterprises) of weighing and measuring instruments. This verification mainly covers balances used for trade.

Monaco has no special metrology and testing laboratory, and other measuring instruments (water and gas meters, gasoline pumps, etc.) are not verified by the Principality. It is, however, customary in Monaco to automatically accept instruments approved and verified in France.

It should be noted that as Monaco does not belong to European Community, the Principality is not obliged to apply the EC Directives. However, as France and Monaco form a union as regards customs control, there can be no obstacle between the two states which could be due to different metrology regulations. This explains why the French regulations can be considered to constitute a regulatory basis in Monaco whenever a metrological control is required.

4 Metrological control of quantities

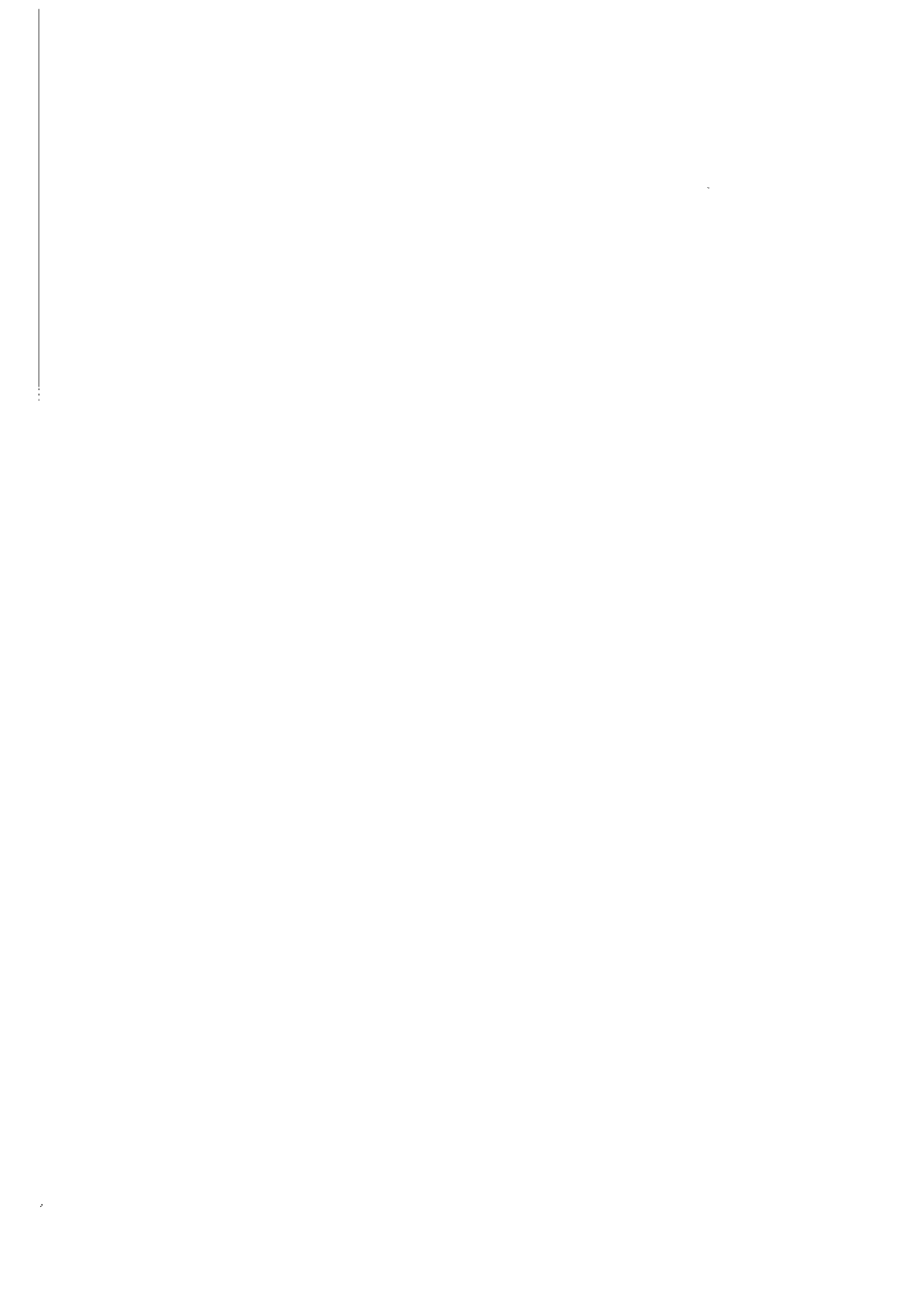
No information received.

5 Services responsible for metrology

No information received.

6 Accreditation and certification systems

No information received.



1 Laws of metrology

- Law No. 2/79 of 31 December 1986 (law on the units of measurement)
- Decree No. 2/79/144 of January 1990 (on the control of measuring instruments).

2 Legal units of measurement

The legal units of measurement are those of the International System of Units (Law No. 2/79 of 1986).

3 Instruments subject to legal control

- weights and weighing instruments,
- liquid fuel measuring devices,
- volume measures for dry materials and for liquids,
- length measures.

5 Services responsible for metrology

5.1 National service of legal metrology

Direction de la Normalisation et de la Promotion de la Qualité
Ministère du Commerce et de l'Industrie, Quartier administratif
RABAT-CHALLAH

Telephone: 212-7-76 37 33
Fax: 212-7-76 62 96

The Direction is in charge of pattern approvals and makes gauging of vats, transport and storage tanks at the request of users.

5.2 Local verification services

There are 28 verification offices which report to the regional delegations of the Ministry of Commerce and Industry.

5.3 Laboratory having custody of national measurement standards

This laboratory is in the stage of construction and will progressively comprise sections for mass, volume, length, pressure, force, temperature, electricity and other quantities (such as concentration, humidity and hydrometry).

5.4 Instrument calibration and evaluation systems

The calibration activity presently covered by the Direction will be extended and integrated in the new laboratory scheme.

6 Accreditation and certification systems

No information received.

(*) Information collected in 1990.

1 Laws of metrology

- IJkwet (Stb. (*) 1989, 10), latest modification by Act of 16 December 1993 (Stb. 650).

This Act covers among other matters the legal base units and supplementary units of measurement, the use in trade of units of measurement and quantities, a number of verification procedures, the obligation to verify measuring instruments and the accreditation of self-verifying organizations. In this Act are furthermore laid down the bases for the following decrees:

- IJkreglement (Stb. 1989, 116), Royal Decree containing general regulations concerning the use and the verification of measuring instruments,
- Eenhedenbesluit 1981 (Stb. 605), Royal Decree on the legal derived units of measurement,
- Standaardenbesluit (Stb. 1989, 102), Royal Decree on the national standards of length, mass, time, thermodynamic temperature, electrical voltage and resistance and the EC standard mass per storage volume of grain,
- IJkregelingen (Stcrt. (**)) 1989, 81, 82 or 83), Ministerial Regulations, containing the metrological and technical requirements with respect to definite measuring instruments,
- Algemeen EEG-Ijkbesluit (Stb. 1989, 118), Algemene EEG-Ijkbeschikking (Stcrt. 1978, 117) and other decrees, together covering the EC Directives on legal metrology,
- Erkenningsregeling ijkbevoegden (Stcrt. 1989, 83) and Regeling werkwijze ijkinstelling en ijkbevoegden (Stcrt. 1989, 139), the first Ministerial Regulation contains provisions with respect to the organization, employees and materials which a self-verifying organization has to fulfil. The second Ministerial Regulation contains the working methods to be followed at the pattern approval and (subsequent) verification.

There are also decrees based on other laws than the IJkwet which contain in some cases an obligation to verify measuring instruments or to examine the metrological aspects of other objects:

- Beschikking Verkeersmeetmiddelen Politie (Stcrt. 1976, 79), Decree concerning regulations on measuring instruments to be used by the police for speed checking by radar, and the checking of wheel-load and deceleration,
- Meetbesluit CO/roet motorrijtuigen (Stb. 1982, 80) with regulations, concerning measuring instruments for CO and soot, used for the examination of motor vehicles,
- Hoeveelheidsaanduidingsbesluit (Stb. 1980, 223), containing regulations on mass and volume of prepackaged goods (see Section 4),
- Decree of 6 February 1980 (Stcrt. 1980, 33), on regulations concerning examination of the engine capacity of mopeds,
- Decree concerning periodical examination of motor vehicles, lorries and trailers (Stcrt. 1982, 253), with regulations concerning brake test instruments, foot crank ergometers, deceleration meters and manometers,
- Besluit alcoholonderzoeken (Stb. 1987, 432), with regulations concerning measuring instruments for the determination of the amount of alcohol in breath. Regeling ademanalyse (Stcrt. 1987, 187), containing further regulations for these instruments,
- Wet op de Kansspelen (Stb. 1964, 483), containing regulations with respect to casino equipment, slot machines and lottery equipment. In this Act are furthermore laid down the bases for other decrees in this area,
- Decree on the practice of pharmacology (Stb. 1963, 75) containing regulations on weighing machines used for the preparation of medicines on prescription.

All Stb.s and Stcrt.s are available from:

Staatsdrukkerij en Uitgeverijbedrijf
Postbus 20014
2500 EA THE HAGUE

Telephone: 31-70-378 99 11

(*) Stb. = *Staatsblad van het Koninkrijk der Nederlanden* (Publication of laws and Royal decrees).

(**) Stcrt. = *Nederlandse Staatscourant* (Dutch Government Gazette).

2 Legal units of measurement

The Dutch legislation on units of measurement (Eenhedenbesluit 1981) is in accordance with EC Directive No. 80/181/EEC dated 20 December 1979 (OJ 1980 L39)(*), latest modification by EC Directive No. 89/617/EEC dated 27 November 1989 (OJ 1989, L357).

The legal units of measurement are therefore those of the International System of Units (SI) supplemented by a few other units, which may be used temporarily or permanently. For use in commerce only legally authorized units of measurement are permitted. There are, however, a few exceptions to this rule. The use of non-authorized units of measurement is, for example, permitted(**):

- in papers produced by systems with a limited number of characters and in accordance with ISO standard 2955 (latest edition, 15 May 1983),
- in the international traffic of goods and services,
- in sea and air transport and rail traffic,
- if different units than the legal units of measurement are used together with legal units and these different units are not larger than and are otherwise dominated by the legal ones (dual labelling).

Publications:

Het Internationale Stelsel van Eenheden (SI) (in Dutch only).

3 Instruments subject to legal control

The following measuring instruments are subject to some form of mandatory legal control:

- in general: measures of length, measures of capacity, weights, measuring instruments for length, surface or volume (except water meters), gas volume meters, weighing instruments when used for trade within the country,
- weighing instruments used for the preparation of medicines on prescription,
- electrical energy meters,
- instruments for measuring the mass per storage volume of grain, used for purposes of trade in grain between member states of the European Community,
- measuring instruments concerning:
 - evidential breath analysing, speed checking by radar, deceleration, wheel-load, brake tests, moped motor-capacity, CO and soot percentage as far as they are used for traffic control and examination of motor vehicles and mopeds,
- bottles used as measuring containers within the framework of the legislation on prepackaged goods.

Apart from the legislation on measuring instruments, legal control exists on the metrological aspects of roulette tables and slot machines.

4 Metrological control of quantities

The legislation on mass and volume of prepackaged goods (Hoeveelheidsaanduidingenbesluit) covers the so-called minimum principle, but leaves the possibility of choosing regulations in accordance with EC Directives No. 75/106 and No. 76/211 dated respectively 19 December 1974 (OJ 1974, L42) and 20 January 1976 (OJ 1976, L46), as modified to date. These directives are based on the principle of averages. The inspection of prepackaged goods is carried out by:

Keuringsdiensten van Waren (the local Food Inspections), Algemene Inspectie Dienst, Ministerie van Landbouw Natuurbeheer en Visserij (General Inspection Service of the Ministry of Agriculture, Management of Nature and Fisheries) and Centraal Orgaan Zuivelcontrole (Central Organization for Dairy Produce Control).

The evaluation of production control systems in industries intending to work with the EC average principle is carried out by the Netherlands Measurements Institute nv (see Section 5.1), which, on the basis of this evaluation, also advises the controlling institution concerning recognition of the control system.

(*) OJ = *Official Journal of the European Communities*, obtainable (among others in Dutch, English, French and German) from Office for Official Publications of the European Communities, L-2985 Luxembourg.

(**) See Beschikking Eenheden (Stcrt. 1977, 221).

5 Services responsible for metrology

5.1 National service of legal metrology

The organization, which by decree is in charge of the execution of the IJkwet is:

NMi IJkwezen bv
Postbus 394
3300 AJ DORDRECHT

Telephone: 31-78-633 23 32
Fax: 31-78-633 23 09

This organization is a subsidiary company of:

Nederlands Meetinstituut nv
Schoemakerstraat 97
Postbus 654
2600 AR DELFT

Telephone: 31-15-669 15 00
Fax: 31-15-661 29 71
Telex: 38373 ijkwz nl

Publications:

NMi, Institute for Metrology and Technology, a brochure describing the activities of the Nederlands Meetinstituut (Netherlands Measurements Institute) available in Dutch and English.

5.2 Local verification services

The Nederlands Meetinstituut is the only metrological body in the country. There are no regional and local verification services.

5.3 Laboratories responsible for maintaining national measurement standards

The control, development and realization of the national measurement standards are assigned by decree to:

NMi Van Swinden Laboratorium bv
Postbus 654
Schoemakerstraat 97
2600 AR DELFT

Telephone: 31-15-669 15 00
Fax: 31-15-661 29 71
Telex: 38373 ijkw nl

This organization is a subsidiary company of the Nederlands Meetinstituut nv.

Publications:

Brochures describing the activities of the standards departments of Van Swinden Laboratorium.

5.4 Instrument calibration and evaluation systems

Calibration of measuring instruments and metrological research are executed on request by the NMi Van Swinden Laboratorium (see for address Section 5.3).

The brochures mentioned above are obtainable from the Nederlands Meetinstituut (for address see Section 5.1).

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The IJkwet offers organizations the opportunity to obtain a qualification to carry out legal verifications. This is possible for all legal verifications with the exception of type approval and verifications with regard to enforcement. The conditions which the qualified organizations have to fulfil are laid down in the Erkenningsregeling ijkbevoegden (Stcrt. 1989, 83).

Organizations can also be accredited with regard to:

- the European "CE" mark (nonautomatic weighing machines),
- the periodical examination of motor vehicles,
- the delivery of calibration gases,
- the EC average principle.

In the Netherlands the accreditation of calibration and testing laboratories is executed by:

NKO-STERIN-STERLAB
Postbus 29152
3001 GD ROTTERDAM

6.2 Legal and applied metrological activities in product certification

Calibration certificates are issued by the Nederlands Meetinstituut nv for all types of metrological equipment.

Publications:

Kalibratiefaciliteitengids NMI

Metrological equipment can obtain a NMI-test certificate or a NMI-QC certificate on a commercial basis. These certificates are issued by the Nederlands Meetinstituut nv.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

In order to obtain accreditation to carry out legal verifications, the European CE mark, the periodical examination of motor vehicles or the delivery of calibration gases; organizations have to meet the conditions of the ISO 9000 series. The accreditation of these organizations is supervised by the Nederlands Meetinstituut nv.

1 Laws of metrology

Act of Weights and Measures (1946) amended by modified text 1977 (French translation published in the OIML Bulletin No. 11/1963), and further modified on 1 January 1994 in accordance with the EEA treaty.

Pursuant to this Act the Department of Trade has issued the following Ministerial Decrees:

- Instructions for the Service of Legal Metrology (1966),
- Regulations for the Service of Legal Metrology (1949).

The National Measurement Service issues general metrological regulations, in accordance with the relevant OIML International Recommendations as well as notices of pattern approval.

2 Legal units of measurement

The sole legal units of measurement are those of the International System of Units (SI).

3 Instruments subject to legal control

Instruments subject to legal control are in general those used for measurement of mass, volume and length in all commercial transactions (not only restricted to retail trade) and for official use.

4 Metrological control of quantities

Metrological control is performed on instruments for the measurement of volume and mass in all commercial transactions and for official use.

5 Services responsible for metrology

5.1 National service of legal metrology

Norwegian Metrology and Accreditation Service
Postbox 6832, St. Olvas Plass, 0130 OSLO 1

Telephone: 47-22-20 02 26
Fax: 47-22-20 77 72

The Norwegian Metrology and Accreditation Service is organized in four departments: National standards, Legal metrology, Accreditation, Administration.

5.2 Local verification services

Nine local verification offices which are all part of the Service.

5.3 Laboratories responsible for maintaining national measurement standards

The national standards laboratory, which forms part of the Service, is responsible for national measurement standards.

5.4 Instrument calibration and evaluation systems

Calibrations are performed both by the national standards laboratory and the local verification offices.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

Norwegian Accreditation, which is a division within the Service, performs accreditation of calibration laboratories, testing laboratories, certifying bodies and other accreditation activities.

6.2 Legal and applied metrological activities in product certification

No information received.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

For legal applications, the certification bodies have to be accredited and bodies which are certified according to ISO 9000 have to be certified by an accredited certifying body.

1 Laws of metrology

- The Weights and Measures Act was established in 1967 by the National Assembly of Pakistan and known as the Weights and Measures (Metric System) Act-V of 1967.
- In exercise of the powers conferred by the Act-V of 1967, the federal government established the Pakistan Weights and Measures (International System) Rules 1974.
- On the basis of the above Act and Rules of the federal government, all provincial governments have established their own laws and rules to exercise legal control on weights, measures and weighing/measuring instruments used in commercial transactions.

2 Legal units of measurement

Pakistan being a Member of the OIML and the BIPM, the adoption of the International System of Units (SI) is in progress in conformity with the Weights and Measures (International System) Rules 1974.

3 Instruments subject to legal control

At present all weights, measures and weighing/measuring instruments used in commercial transactions are subject to legal control, which is exercised by provincial governments.

4 Metrological control of quantities

The control of prepackaged commodities is carried out according to the provincial acts. It is the responsibility of the provincial governments.

5 Services responsible for metrology**5.1 National service of legal metrology**

The authority responsible for legal metrology at the national level is:

Director, Pakistan Standards Institution
Ministry of Industries and Production
Government of Pakistan
39, Garden Road
Saddar
KARACHI 74400

Telephone: 92-21-772 95 27
Fax: 92-21-772 81 24
Telegram: PEYASAI

The Pakistan Standards Institution is the nodal authority for coordination of all the activities relating to legal metrology and adoption of SI units of measurement. It is also responsible for:

- coordination with the OIML,
- establishment of standards,
- advice on adoption of new units,
- training of field staff of provincial governments and other organizations,
- coordination with provincial governments regarding implementation of the system in various organizations,
- publicity.

5.2 Local verification services

The enforcement of laws on weights and measures is the responsibility of the provincial government Authorities. Suitable enforcement structures have been set up by all the provincial governments for this purpose.

There is a provision for in-service training of the provincial government enforcement officials with the Pakistan Standards Institution.

5.3 Laboratories responsible for maintaining national measurement standards

The National Physical and Standards Laboratory, Islamabad, under the Ministry of Science and Technology, is responsible for:

- coordination with the BIPM,

- maintenance of primary physical standards of measurement. Dissemination, development and production of secondary standards,
- maintenance and production of standard reference materials. Standardization of materials in terms of chemical composition, structural determination and measurement of physical and physico-chemical properties,
- annual verification/inspection of working/secondary standards of the Labour Directorates of provincial governments and other scientific and industrial organizations, etc.

5.4 Instrument calibration and evaluation systems

Some work of calibration of gauges, energy meters, etc. is carried out by the Central Testing Laboratories. Further steps are being taken to establish a national structure to coordinate testing and calibration facilities in the country.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The Pakistan Standards Institution has not yet started the accreditation of testing laboratories. This work is scheduled to start at national level. At the initial stage, eight standards of the EN 45000 series on accreditation of testing laboratories have been adopted as Pakistan Standards (PS 3500 series).

6.2 Legal and applied metrological activities in product certification

The traceability and authenticity of the measuring instruments used in product testing is usually checked and verified during preliminary inspection of factories for product certification.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

The ISO 9000 quality management system has not yet been registered in the country. However, sixteen ISO 9000 series standards have been adopted as Pakistan Standards (PS 3000 series), which are under consideration for introduction in the country.

Pakistan standards on laboratory accreditation (PS 3500 series) and on quality management and quality assurance (PS 3000 series) are available from the Pakistan Standards Institution.

1 Laws of metrology

The basis of the metrological activity in Poland is the Act of Parliament, Law on Measures, of 3 April 1993. The most important derived legal documents are:

- Decree of the Council of Ministers of 27 December 1993 on the admittance for use of units of measurement outside the International System of Units (SI),
- Regulation of the President of the Central Office of Measures of 3 January 1994 on determination of the measuring instruments subject to verification, the terms and procedure of their application for verification and determination of the verification marks,
- Regulation of the President of the Central Office of Measures of 3 January 1994 on determination of the measuring instruments subject to pattern approval and the terms and procedure of their application for pattern approval,
- Regulation of the President of the Central Office of Measures of 17 January 1994 on establishment of the names, definitions and symbols of the legal units of measurement,
- Regulation of the President of the Central Office of Measures of 15 April 1994 on establishment of a procedure of pattern approval of measuring instruments,
- Regulation of the President of the Central Office of Measures of 29 April 1994 on determination of terms and a procedure of accreditation of the measurement laboratories,
- Metrological regulations issued by the President of the Central Office of Measures concerning requirements imposed on measuring instruments subject to metrological control as well as the appropriate checking methods.

2 Legal units of measurement

The legal units of measurement are the following:

- units of the International System of Units (SI), as well as their decimal sub-multiples and multiples,
- units outside the SI system:
nautical mile, light year, hectare, barn, litre, tonne, metric carat, atomic mass unit, tex, minute, hour, day, year, knot, revolutions per second, revolutions per minute, degree, minute, second, grad, dioptr, bar, millimetre of mercury, electronvolt, watt hour, amper hour, var, lumen hour, lux hour, röntgen, bel, neper.

3 Instruments subject to legal control

Measuring instruments are subject to some form of legal control if they are used:

- in trade to determine quantity or quality of goods or services in order to obtain a proper basis for the settlement of accounts,
- in production and testing of pharmaceuticals,
- in official operations,
- for safety, health and environmental protection.

4 Metrological control of quantities

Only measuring instruments used for determination of quantities of prepackaged products (mass, volume, surface, length, etc.) are subject to legal metrological control.

5 Services responsible for metrology

5.1 National service of legal metrology

Główny Urząd Miary (GUM)
(Central Office of Measures)
ul. Elektoralna 2
00-950 WARSAW

Telephone: 48-22-620 06 86
Fax: 48-22-620 83 78
Telex: 813642

The President of the Central Office of Measures is the central organ of the Polish administration of measures, responsible directly to the Prime Minister.

Services provided by GUM in the field of metrology include:

- that of national institute of metrology, especially the following: establishment and maintenance of the national measurement standards, traceability of national measurement standards to international standards and dissemination of the values of units to ordinary measuring instruments and, in general, improvement of methods and means of measurement; this activity also includes reference materials,
- that of national bureau of legal metrology, especially the following: definition and promotion of legal units of measurement, carrying out metrological control regarding performance of measuring instruments and their application, elaboration and issuing of legal regulations concerning metrological control and other activities in the field of metrology,
- that of a calibration service for measuring instruments which are not subject to compulsory control; calibration is carried out on request of the users, in the laboratories of GUM, regional offices and, in the future, in accredited laboratories, according to their metrological competence.

5.2 Local verification services

The territorial network of legal metrology comprises nine Regional Verification Offices (located in the following cities: Warsaw, Kraków, Wrocław, Poznań, Katowice, Gdańsk, Łódź, Bydgoszcz, Szczecin) and sixty-three Local Verification Offices.

The distribution of tasks between the GUM laboratories and Regional and Local Verification Offices follows, in principle, the hierarchy of measuring instruments.

5.3 Laboratories responsible for maintaining national measurement standards

The laboratories of GUM are responsible for establishment and maintenance of national measurement standards.

5.4 Instrument calibration and evaluation systems

Activities aimed at the establishment of an accreditation body and a network of calibration laboratories began on 1 January 1994.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

On the basis of the Law on Measures and the regulation on accreditation, mentioned in Section 1, the organization of the laboratory accreditation system for legal metrology and calibration began on 1 January 1994.

The above-mentioned regulation requires traceability to national or international standards. All measurements performed in Poland related to verification, calibration and testing should be traceable to the national standards.

The traceability of national standards in Poland is given below:

- the length unit (metre) is realized according to the definition by the method given in Recommendation 3 (CI-1992) of the Comité Consultatif pour la Définition du Mètre,
- the standards of kilogram, volt and ohm are calibrated against BIPM standards,
- in the range of temperature measurements the International Temperature Scale ITS-90 is being realized,
- the standards of light intensity are calibrated at the BIPM in the "average unit" of 1985,
- standards of time and frequency are traceable to the BIPM,
- measurements of amount of substance are traceable to the SI unit (mole) by measurements of mass (weighing) and conversion to the mole using reference data of relative atomic or molecular mass.

6.2 Legal and applied metrological activities in product certification

The product certification is the responsibility of:

Polskie Centrum Badań i Certyfikacji (PCBC)
(Polish Centre for Testing and Certification)
ul. Kłobucka 23 a
02-699 WARSAW

Telephone: 48-22-470 742
Fax: 48-22-472 242
48-22-471 222

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

Following the implementation of ISO 9000 quality management systems in industry, the number of applications for verification and calibration of measuring instruments is increasing.

1 Laws of metrology

Decree 291, published on 20 September 1990, established new foundations of metrological control in order to harmonize the previous system of national metrological control with European Community Directives.

Specific regulation No. 962 of 9 October 1990 established the general conditions for the implementation of metrological control in accordance with Decree 291 of 1990.

These documents apply:

- to instruments used in commercial transactions, for the determination of taxes and salaries and in the field of safety, health and energy saving,
- to test benches and equipment required for the implementation of metrological control,
- to net content prepackage control.

They also provide for:

- the implementation of metrological control in four steps (pattern approval, initial verification, periodic verification and subsequent verification),
- establishment of specific regulations for each type of measuring instrument,
- establishment of a national system of certification of measuring instruments not yet subject to state control,
- delegation of competence to private bodies for the execution of initial and periodic verification.

2 Legal units of measurement

Decree 427 of 7 December 1983 adopted the International System of Units (SI) for use throughout the national territory.

3 Instruments subject to legal control

The official (compulsory) control in accordance with specific regulations applies to the following measuring instruments:

- prepackaging,
- material measures of length,
- length meters,
- automatic level gauges for measuring the level of liquid,
- taximeters,
- tachographs,
- planimeters,
- capacity measures for liquids,
- capacity measures for dry substances,
- capacity measures for milk,
- measuring container bottles,
- road and rail tankers,
- calibration of tanks of vessels,
- fixed storage tanks,
- determination of oil products quantities at 15°C,
- gas volume meters,
- cold-water meters,
- hot-water meters,
- meters for liquids other than water,
- road-control speed meters,
- weights,
- nonautomatic weighing instruments,
- automatic checkweighing and weight grading,
- continuous totalizing weighing machines,
- instruments for measuring the hectolitre mass of cereals,
- alcoholometers and alcohol hydrometers,
- alcohol tables,
- alcohol testers,
- moisture meters,
- breath analyzers,

PORTUGAL

- material testing machines (tension and compression machines),
- tyre pressure gauges,
- sound-level meters,
- parking chronometers,
- chronometers,
- electrical energy meters,
- meters,
- clinical thermometers (Hg),
- refractometers,
- instruments for measuring car exhaust gases.

Regulations for other instruments are forthcoming, some of which are already in preparation.

4 Metrological control of quantities

Legal control of content of prepackages and of measuring container bottles is planned.

5 Services responsible for metrology

5.1 National service of legal metrology

The organ responsible for legal metrology is the Portuguese Institute for Quality and its department of metrology service.

Instituto Português da Qualidade (IPQ)
Direcção de Serviços de Metrologia Legal
Rua C à Avenida dos Três Vales
2825 MONTE DA CAPARICA

Telephone: 351-1-294 81 96
Fax: 351-1-294 81 88

5.2 Local verification services

Regional divisions of the Ministry of Industry and Energy are located in Porto, Coimbra, Lisbon, Evora and Faro.

There are local verification services in 305 municipalities.

5.3 Laboratories responsible for maintaining national measurement standards

The Portuguese Institute for Quality is responsible for the preservation and development of the national standards.

5.4 Instrument calibration and evaluation systems

In addition to the compulsory control mentioned in Section 3, there are numerous instruments used in official laboratories, administrations, public and private laboratories which also require calibration.

The integration of all the existing calibration facilities into a national system of metrology is under consideration with the aim of realizing appropriate calibration hierarchy schemes.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The laboratories accreditation system comes under the auspices of the Portuguese System for Quality (SPQ), (Decree-Law 234/93).

This accreditation system is defined through the Directives of the National Council for Quality (CNQ) and follows the NP EN 45001 requirements.

The IPQ is the national body responsible for standardization, certification of products, accreditation and metrology.

The laboratories measurement standards should be traceable to national or international standards or to certified reference materials.

6.2 Legal and applied metrological activities in product certification

The certified products scheme covers measuring instruments submitted to metrological control (or calibration).

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

In a manufacturing quality assurance system, a calibration programme is required for verification and test equipment, in order to ensure traceability to national standards.

1 Laws of metrology

The regulation of metrological activity in Romania is based on the Ordinance of the Romanian Government No. 20/21.08.1992, validated by the Law No. 11/1994.

The Government Decision No. 481/1992 regulates the functioning of the Romanian Bureau of Legal Metrology (BRML) which is the specialized body of public administration responsible for applying government policy in the field of metrology.

At present, a series of Legal Metrology Instructions is being elaborated and approved by the government in order to regulate activity in the field of legal metrology:

- traceability of measuring instruments to national standards,
- pattern tests and pattern approvals,
- national system of standards,
- metrological control,
- metrological authorizations,
- metrological marks.

Norms of legal metrology on measuring instruments subject to state control are being elaborated, each of them containing provisions on:

- scope,
- terminology,
- classification and description,
- categories of metrological control,
- metrological conditions,
- technical conditions,
- test/verification methods.

The elaboration of these norms is in accordance with the provisions of OIML International Recommendations, especially those covered by the OIML Certificate System.

2 Legal units of measurement

As a signatory to the Convention du Mètre in 1883, Romania has aligned itself with all the international recommendations which have resulted from the Convention, including all the decisions taken by the Conférence Générale des Poids et Mesures.

The legal system of measurement units is the International System of Units (SI) which is compulsory for all the fields of activity.

In the case of export agreements, other units of measurements besides those of the SI can be used on the request of external partners and by mutual agreement.

3 Instruments subject to legal control

State metrological control covers the standards corresponding to all the levels of accuracy and the categories of measuring instruments used in the fields of public interest such as: commercial relations and trade, control of merchandise and passenger traffic, labour and environmental protection, health care, production and control of medicines, fiscal and mailing operations, legal examinations.

4 Metrological control of quantities

The law on metrology includes a section on the metrological control of measurements and delivered quantities inclusively.

Regulations on the accuracy of measurement in various fields of public interest are laid down by specialized departments with the consent of the BRML.

5 Services responsible for metrology

5.1 National service of legal metrology

The Romanian Bureau of Legal Metrology (BRML)
21, Bulevardul N. Balcescu, sector 1
70 112 BUCHAREST

Telephone: 40-1-613 16 54
Fax: 40-1-312 05 01

5.2 Local verification services

Fourteen interregional legal metrology inspection units which coordinate fourteen local laboratories of metrology.

A large number of laboratories are also authorized by the BRML for verification in fields of public interest.

5.3 Laboratories responsible for maintaining national measurement standards

The National Institute of Metrology maintains the national standards for all the units of measurement of physical quantities.

Institutul National de Metrologie
11, Str. Vitan Barzesti, sector 4
BUCHAREST

Telephone: 40-1-634 33 45

5.4 Instrument calibration and evaluation systems

The national standards as well as other standards calibrated in Romania make up the National System of Standards.

Test procedures are applied to the evaluation of measuring instruments with a view to pattern approval given by the Pattern Approval and Testing Laboratory (LIAM) and the specialized laboratories of the National Institute of Metrology.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The legal metrology laboratories are authorized by the BRML and its interregional inspection units.

Traceability to national and international standards is provided by periodical and mandatory calibrations on the basis of pre-established transmission schemes.

The authorization of the laboratory confirms the affiliation of its standards to the National System of Standards.

6.2 Legal and applied metrological activities in product certification

Measuring instruments involved in product certification are calibrated in industrial metrology laboratories which turn are authorized by the BRML.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

The Commission for Metrological Evaluation of Laboratories - a body involved in the accreditation of industrial metrology laboratories for product certification - is being organized.

1 Laws of metrology

The following Acts are currently in force in the Russian Federation:

- Law of 27 April 1993, on assurance of measurement uniformity.
In accordance with Article 4 of the Law, the state administration of the activities related to assurance of measurement uniformity in the Russian Federation is executed by the State Committee of the Russian Federation for Standardization, Metrology and Certification (GOSSTANDART).
- Law of 10 June 1993, on standardization.
- Law of 10 June 1993, on certification of products and services.
- Governmental Decree of 12 February 1994, on organization of activities on standardization, assurance of measurement uniformity, certification of products and services.

In addition, a large number of regulations, rules, state standards and other guiding and methodological documents in various fields of metrology are issued as GOSSTANDART decrees or GOSSTANDART metrological institutes documents.

Main reference publication on metrological documentation: *Ukazatel. Normativno-teknicheskie dokumenti v oblasti metrologii* (List of normative and technical documents in field of metrology, Standards Publisher, 1993).

2 Legal units of measurement

The legal units of measurement within the Russian Federation are those of the International System of Units (SI). Units of measurement used in the country are regulated by the State Standard (GOST 8.417-81, State System for assurance of measurement uniformity. Units of physical quantities). Since February 1992 this Standard has been recognized by the Commonwealth of Independent States (CIS). A Governmental Decree concerning measurement units in the Russian Federation is currently in preparation.

3 Instruments subject to legal control

According to the Law on assurance of measurement uniformity, measuring instruments are subject either to compulsory verification carried out by verification bodies or to calibration carried out by calibration laboratories, in particular, laboratories within enterprises and organizations.

The GOSSTANDART establishes the list of measuring instruments subject to compulsory metrological verification. It includes measuring instruments used in the following areas:

- health service, veterinary service, environmental protection, assurance of labour safety,
- commercial operations and payments between the buyer and the seller, including gambling machines and devices,
- state accounting and stock-taking operations,
- assurance of state defence,
- geodetic and hydrometeorological activities,
- banking, taxation, customs and postal operations,
- manufacture of products supplied on contract to satisfy state requirements in accordance with Russian Federation legislation,
- test and inspection of the quality of products to determine their compliance with the mandatory requirements of state standards of the Russian Federation,
- mandatory certification of products and services,
- measurements performed on the instructions of juridical bodies, prosecutor's departments, Court of Arbitration, state executive bodies of the Russian Federation,
- registration of national and international sporting records.

The normative Acts issued by the republics incorporated in the Russian Federation, autonomous regions, autonomous districts, territories, regions, and the cities of Moscow and St. Petersburg, may extend the state metrological control and supervision to other areas of activity.

4 Metrological control of quantities

State metrological control over the amount of goods transferred during commercial operations is carried out to measure the mass, volume, flow or other quantities characterizing the amount of these goods.

State metrological control over the amount of prepackaged goods in containers of any type during their packaging and sale is carried out in the cases when the content of a container cannot be changed without its

opening or deformation and the mass, volume, length, area or other quantities indicating the amount of the packaged goods are marked on the container.

Procedures for the above-mentioned metrological control are established by the GOSSTANDART in accordance with legislation of the Russian Federation.

Metrological control also includes:

- evaluation and approval of patterns of measuring instruments,
- verification of measuring instruments,
- licensing of manufacture, repair, sale and rent of measuring instruments.

5 Services responsible for metrology

5.1 National service of legal metrology

The state metrological service comes under the authority of the GOSSTANDART and includes:

- state scientific metrological centres,
- bodies of the state metrological service in the territories or republics forming part of the Russian Federation, autonomous regions, autonomous districts, regions, and the cities of Moscow and St. Petersburg.

GOSSTANDART of Russia
Leninsky Prospect, 9
117049 MOSCOW

Telephone: 7-095-236 40 44
Fax: 7-095-237 60 32
Telex: 411 378 GOST
Telegram: Moskva-Standart

Among other activities, GOSSTANDART is in charge of the state service of time and frequency, the state service of certified reference materials and the state service of standard reference data of physical constants and properties of substances and materials.

The state scientific metrological centres are responsible for the development, improvement, conservation and application of state measurement standards of physical units as well as for the development of normative documents on the assurance of measurement uniformity.

Bodies of the state metrological service execute state metrological control and supervision throughout the Russian Federation.

5.2 Local verification services

There are over 100 bodies of the state metrological service within the Russian Federation. In addition, the state administrative bodies of the Russian Federation, as well as enterprises, organizations and institutes, provide legal metrology services where uniformity, accuracy of measurement, or metrological control and supervision are required.

Metrological control and supervision are carried out by:

- calibration of measuring instruments,
- supervision of the condition and application of measuring instruments, certified measurement procedures, measurement standards used for calibration, observance of the metrological regulations and norms on assurance of measurement uniformity,
- issue of compulsory directives on the prevention or elimination of contraventions of metrological regulations and norms,
- checking of timely presentation of measuring instruments for type approval, verification or calibration.

5.3 Laboratories responsible for maintaining national measurement standards

There are currently 114 state primary standards of various quantities which are maintained and used by nine metrological institutes according to their specialization. There are working standards for verification of measuring instruments in 103 Centers for Standardization, Metrology and Certification (bodies of the state metrological service).

5.4 Instrument calibration and evaluation systems

The Russian Calibration System was set up in 1994. Measuring instruments that are not subject to mandatory verification may be subject to calibration during production or repair, importation, use, rent or sale. Calibration of measuring instruments is carried out by metrological services using measurement standards traceable to the state measurement standards.

In accordance with new legislation, calibration laboratories should be accredited by the state metrological bodies.

A voluntary certification system for measuring instruments was established in 1993 and registered by the GOSSTANDART.

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

Decisions concerning measuring instrument type approvals shall be made by the GOSSTANDART and attested by a certificate of type approval whose validity period shall be fixed at the time of its issue. Type approvals shall be recorded in the State Register of measuring instruments kept by the GOSSTANDART.

Testing for type approvals shall be conducted by the scientific metrological centres of the GOSSTANDART (accredited by GOSSTANDART as state centres for testing measuring instruments). The GOSSTANDART may authorize other specialized organizations to carry out the functions of state-accredited test centres for measuring instruments.

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

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

About 14 500 types were entered in the State Register of measuring instruments as at the beginning of March 1995.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The following normative documents have been developed and are in use:

- PR 50.2.010-94: State test centres for measuring instruments. Requirements and procedure for accreditation.
This document sets out general rules for accreditation of test centres within the system of testing and pattern approval of measuring instruments. The rules are also applied to accreditation of test laboratories (centres) to obtain authorization for carrying out tests within the voluntary certification system for measuring instruments in conformity with various defined metrological and technical requirements. This voluntary certification system was introduced in 1994.
- PR 50.2.008-94: Rules for accreditation of head and basic metrological services of state administration bodies of the Russian Federation and associations of juridical persons.
- PR 50.2.014-94: Accreditation of metrological services of juridical persons for carrying out verification of measuring instruments.
Accreditation of calibration laboratories should be performed within the Russian Calibration System (see Section 5.4).

The general system for accreditation of measurement laboratories in Russia has common features with NAMAS, and is known as RuMAS (Russian Measurement Laboratories Accreditation System). The system includes all calibration, verification, analytical, environmental, radiation safety and other measurement laboratories. All the laboratories accredited by RuMAS may be accredited (if necessary) in any certification system. In this way, the traceability of results of measurements used for certification purposes is assured.

6.2 Legal and applied metrological activities in product certification

The GOSSTANDART developed the GOST R Certification System based on the Law on certification of products and services. There are over 300 certification bodies and about 1000 testing laboratories and centres accredited within the GOST R Certification System. Verification is compulsory for those measuring instruments that are used in mandatory certification of products and services. Other instruments may be subject to calibration.

Normative documents and rules take into account provisions of the basic IEC/ISO Guides and EN 45001, 45002, 45003 Standards.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

The ISO 9000 series of standards was adopted in Russia in its entirety as national standards, including all requirements for measurements and measuring instruments such as calibration, maintenance, traceability to measurement standards within the national measurement system. All national measurement standards are traceable to international ones. The voluntary system for certification of quality management systems was registered by the GOSSTANDART in 1993.

Note: Information, documents and publications on the above subjects are available from the GOS-STANDART.

1 Laws of metrology

There are two laws in force in the Kingdom of Saudi Arabia concerning Standardization and Metrology, promulgated by Royal Decrees:

The laws of Calibration and Measurements issued under Royal Decree No. 29 (1963) containing regulations concerning

- the legal system of units (SI units),
- the establishment of measurement and calibration centres,
- the custody of national measurement instruments,
- the stamping of measuring instruments,
- the labelling of prepackages,
- fees and fines.

The second law (Royal Decree No. M/10), concerning the establishment of the Saudi Arabian Standards Organization (SASO), was issued on 6 April 1972. Accordingly, the SASO is responsible for all activities related to standards and measurements including establishment of national standards for all commodities and products as well as metrology, methods of sampling and testing, certification, quality marking and for the general coordination of all activities related to calibration and measurement in the Kingdom.

2 Legal units of measurement

The legal system of units of measurement in the Kingdom is the International System of Units (SI).

3 Instruments subject to legal control

All weights, measures and weighing/measuring instruments used in commercial transactions within the Kingdom.

4 Metrological control of quantities

Control is exercised through relevant Saudi Standards which are mandatory.

5 Services responsible for metrology**5.1 National service of legal metrology**

The authority responsible for legal metrology at the national level is:

Saudi Arabian Standards Organization (SASO)
PO Box 3437
11471 RIYADH

Telephone: 966-1-452 00 00
Fax: 966-1-452 00 86
Telex: 401610 SASO SJ
Telegram: GIASY

The SASO is the central authority for coordination of all activities relating to legal metrology. It is responsible for the custody and maintenance of the National Standards of Measurements and for the calibration of reference standards and other instruments used in legal metrology as well as in scientific and industrial metrology.

The SASO has established a metrology laboratory called the National Measurement and Calibration Laboratory (NMCL) with facilities for measurement of length, volume, density, mass, pressure, force, temperature, ionizing radiation, time and frequency, electrical and electronic parameters. This laboratory ensures through calibration and verification that reference measurement standards used in other laboratories of the Kingdom are within the prescribed limits of tolerances. It carries out, on request, certified calibrations of standards and instruments for other laboratories, scientific and industrial organizations. The facilities at the NMCL are being expanded to cover other parameters such as humidity, high-frequency and microwave measurements, etc. Accuracies of existing standards are also being improved.

5.2 Local verification services

The Product Quality and Control General Directorate (PQCGD) under the auspices of the Ministry of Commerce is responsible for enforcement of regulations on weights and measures used for trade. This

department has regional offices/laboratories at various places in the Kingdom. The reference standards and instruments of the PQCGD are referred to the NMCL (SASO) for calibration and verification.

5.3 Laboratories responsible for maintaining national measurement standards

The National Measurement and Calibration Laboratory of the SASO (see Section 5.1).

5.4 Instrument calibration and evaluation systems

A scheme for accreditation of other laboratories has been instituted by which the laboratories, on request, after inspection and review of their facilities and capabilities, are accredited to undertake the verification/calibration of standards and instruments and to issue certificates.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

The main legal act is Law No. 505/1990 of the set of laws and connected decrees and regulations on metrology:

- Decree of the Federal Office for Standardization and Metrology (OFNM) of the former Czechoslovakia, No. 69/1991 comprising the set of decrees, taken from the Federation, according to which the Law on metrology is enforced,
- Regulation No. M-101/1991 of the OFNM and Regulation No. 1/1994 of the Slovak Office for Standardization, Metrology and Testing (OSNME) which establish the list of categories of legal measuring instruments,
- Regulation No. 3/1993 of the OSNME on marks of pattern approval and marks of verification.

2 Legal units of measurement

The use of the International System of Units is regulated by law No. 505/1990 of the set of laws on metrology. The law permits also the use of "other units" listed in the Slovak standard STN 011300 *Legal units of measurement* of 1988.

3 Instruments subject to legal control

The list of categories of measuring instrument subject to legal control is established by the OFNM regulation No. M-101/1991 amended by the UNMS SR regulation No. 1/1994. It concerns:

- length measuring instruments for: products sold by the meter, measuring tapes for precision measurement, taximeters, meters of distance, laser filters intended for measurement, checking sieves,
- mass measuring instruments: commercial and special weights, nonautomatic weighing instruments for commercial use, for control of dosimeters and for medical use, beltweighers for commercial purposes and automatic road and rail weighbridges,
- road speedometers used by police,
- instruments for measuring force and for mechanical testing: testing machines for tension and compression, pendulum impact testing machines, tension measuring devices for prestressed concrete, hardness testing machines and control torque wrenches,
- volume and flow meters: graduated drinking glasses, metallic volumetric flasks, transportable casks and tanks, fixed storage tanks, volume meters for liquids (commercial and service stations), butyrometers, ethylometers, hydraulic parts of heat meters, flow meters for quantities of liquids (motor fuel, combustible), water meters, diaphragm gas meters, rapid gas meters for laboratories,
- pressure measuring instruments: ophthalmotonometers, instruments for measuring blood pressure with elastic elements and of mercury type,
- temperature measuring instruments: medical and veterinary thermometers, thermometers for determining heat balance, selected thermometers for testing and thermometers for heat meters:
- instruments for measuring electrical and magnetic quantities: electrical energy meters (mass and domestic consumption of electrical energy), measuring transformers of electrical current and voltage, Epstein devices for measuring magnetic properties of sheet metal during testing, coercimeters, permeameters,
- selected laboratory density meters,
- optical radiometers for spectral range 490 nm to 2800 nm,
- measuring instruments for measurement in nuclear physics: volumetric activity, diagnostic and therapeutic preparations, dosimetric doses and sources of radionuclides,
- measuring instruments for acoustic pressure, sound level meters and integrating sound level meters, acoustic band filters, audiometers and measuring microphones,
- instruments for ph-metry and ionometry: selected instruments used in fields of health and environment,
- refractometers and conductometers selected for demonstration tests,
- moisture meters for cereal grains and oilseeds for commercial use,
- analyzers for measuring petrol engine exhaust emissions.

4 Metrological control of quantities

The metrological control of quantities is carried out by:

- the Slovak Metrological Institute performing pattern approval of measuring instruments and verification of standards,

- the Legal Metrology Service of the Slovak Republic performing pattern approval and verification of measuring instruments,
- the Slovakian Metrological Inspection responsible for metrological supervision.

5 Services responsible for metrology

The supreme body of legal metrology in Slovakia is:

Úrad pre Normalizáciu, Metrológiu a Skúšobníctvo SR
(Slovak Office for Standardization, Metrology and Testing)
Štefanovičova 3
SK-814 39 BRATISLAVA

Telephone: 42-7-496 847
Fax: 42-7-491 050

5.1 National service of legal metrology

Služby legálnej metrológie SR
(Legal Metrology Service of the Slovak Republic)
Hviezdoslavova 31
SK-975 90 BANSKÁ BYSTRICA

Telephone: 42-88-246 07
Fax: 42-88-535 98

5.2 Local verification services

Regional verification services are represented by five branches of the Legal Metrology Service of the Slovak Republic in the following cities: Bratislava, Banská Bystrica, Košice, Nitra and Žilina.

The Law on metrology admits that under certain conditions the national metrological centres could be authorized to conduct verification of legal measuring instruments. Thirty-six metrological centres currently perform verification of water meters, gas meters and electrical energy meters.

5.3 Laboratories responsible for maintaining national measurement standards

The national measurement standards are preserved and maintained by the Slovak Metrological Institute. This Institute also carries out research in the respective fields of metrology, develops new measurement standards, establishes and applies metrology regulations.

Slovenský metrologický ústav
(Slovak Metrological Institute)
Karlovecká 63
SK-842 55 BRATISLAVA

Telephone: 42-7-729 820
42-7-794 111
Fax: 42-7-729 592

5.4 Instrument calibration and evaluation systems

Calibration of measuring instruments is carried out by accredited centres of the calibration service. The majority of them are included in the Slovak Association of Calibration.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

Accreditation system for legal metrology and testing laboratories is provided by the Slovak National Accreditation System (SNAS) and is ensured by the Technical Committee for accreditation of calibration laboratories.

The SNAS is the only national accreditation system in the territory of the Slovak Republic ensuring accreditation of testing and calibration laboratories, inspection bodies, certification bodies for products, services, quality system, and competence of personnel in conformity with European standards EN 45000.

The accreditation procedure requires and complies with the hierarchy of traceability of measuring instruments to national or international standards.

6.2 Legal and applied metrological activities in product certification

Metrological control is actively applied in product certification:

- in testing laboratories by making tests of products for certification purposes,
- in establishing procedures of testing and measuring parameters and characteristics of products,
- in control and verification of testing devices in laboratories.

Metrology experts also participate in accreditation and subsequent control of testing laboratories and of certified subjects.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

Legal and applied metrology is widely used in the accreditation of laboratories in factories, in the accreditation, control and preparation of industrial calibration and testing laboratories requesting certification of quality assurance systems. Legal metrology participates in the acceptance of technical devices and in integral control of quality assurance systems. Metrology has a role in evaluation and audits during the certification of quality assurance systems with producers and subcontractors, as well as in planification, installation and setting into operation of production systems. All metrological activities are conducted in conformity with the provisions and procedures of legal metrology, international standards of ISO/IEC and, where relevant, ISO/IEC guides.

1 Laws of metrology

The Law on Metrology (December 1994) regulates the system of units of measurement, measurement standards and other legal measuring instruments, pattern approval of legal measuring instruments, their verification, manufacture, maintenance and sale, metrological supervision of product quantities and marking of prepackaged products.

Regulations based on the Law on Metrology:

- Decree on the legal units of measurement in the Republic of Slovenia,
- Decree on the use of national measurement standards, maintenance and traceability to the international level,
- Decree on the types of measuring instrument which require obligatory type approval and verification,
- Decree on the time limits within which regular verification of measuring instruments should be performed,
- Decree on the type and form of markings to be used in verification and on the contents and form of conformity certificate for measuring instruments,
- Decree on the inspection and marking of prepackaged products,
- Decree on the appointment to perform pattern evaluations, verifications, control examinations and supervision of quantities and marking of prepackaged products.

2 Legal units of measurement

The units of the International System of Units (SI) shall be used in the Republic of Slovenia. The legal units of measurement are those permitted under EC Directive 80/181/EEC as amended by EC Directive 85/1/EEC and 89/617/EEC.

3 Instruments subject to legal control

In general, all instruments or measuring systems for weighing or measuring in commercial transactions are subject to legal control. Other instruments, such as gas and electrical energy meters, water and volume meters, etc., instruments used in health care, environmental protection and general technical safety, may also be subject to regulation in accordance with the Law on Metrology.

4 Metrological control of quantities

Prepackages are subject to metrological control. The Decree on metrological supervision of quantities and marking of prepackaged products will be amended in accordance with the harmonized EC requirements as soon as possible.

5 Services responsible for metrology

5.1 National service of legal metrology

Standards and Metrology Institute of the Republic of Slovenia (SMIS)
Ministry of Science and Technology
Kotnikova 6
61000 LJUBLJANA

Telephone: 386-61-13 12 322
Fax: 386-61-314 882

The Standards and Metrology Institute of the Republic of Slovenia (SMIS) shall perform professional and related assignments as well as organizational assignments in the metrology system area, which are provided by the Law on Metrology and other laws.

The tasks of the SMIS in the metrology system area shall be in particular:

- to propose the strategy of metrology,
- to take part in the preparation of technical and other regulations issued as provided by the Law by the minister in charge of metrology,
- to propose liaisons with international and foreign organizations of metrology,
- to collaborate with international organizations and to represent the national metrology service in them,
- to propose and define priorities with regard to the selection and financing of research and development projects related to metrology,
- to organize the national calibration service,
- to plan, implement and maintain the standards base.

5.2 Local verification services

Regional verification and inspection is carried out by verification offices which form part of the Standards and Metrology Institute.

Verification Office
Grudново nabrežje 17
61000 LJUBLJANA

Telephone: 386-61-210 722

Verification Office
Tkalska 15
63000 CELJE

Telephone: 386-63-32 861

Regional and local verification is also carried out by public and private laboratories accredited by the national accreditation service and authorized for the purpose by the minister in charge of metrology. Laboratories form part of the national verification service coordinated under the auspices of the Standards and Metrology Institute.

5.3 Laboratories responsible for maintaining national measurement standards

A national measurement standard is one recognized by the Standards and Metrology Institute to serve, in the Republic of Slovenia, as the basis for assigning values to other measurement standards.

National measurement standards are maintained in several calibration laboratories distributed throughout the country and coordinated through the Standards and Metrology Institute.

5.4 Instrument calibration and evaluation systems

Calibration or evaluation of instruments and measurement standards not subject to legal control is carried out by the national calibration service which comprises a number of authorized public and private laboratories accredited by the national accreditation service.

6 Accreditation and certification systems

6.1 Accreditation system on legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

All calibration and verification laboratories working on legal metrology have to be accredited by the national accreditation service and authorized by the minister in charge of metrology.

Accreditation for calibration and testing laboratories, certification and inspection bodies is carried out by the Standards and Metrology Institute which performs the tasks of a national accreditation service as provided by the Law on Standardization (December 1994).

In all tasks of verification and calibration of measuring instruments and measurement standards, the traceability related to the measurement standards of higher hierarchical level must be defined and assured as far as the national measurement standards in the Republic of Slovenia, and through them to the international level.

6.2 Legal and applied metrological activities in product certification

Legal and applied metrological activities in product certification are involved in the technical regulations of particular fields as requirements for calibration of measurement standards, measuring instruments and measuring systems and their traceability to national or international measurement standards.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

Legal and applied metrological activities in ISO 9000 quality management are implemented through the ISO 9000 and ISO 10000 series which are adopted as Slovenian national standards.

1 Laws of metrology

Spanish metrology is mainly governed by the Law on Metrology of 18 March 1985 (Ley 3/1985) superseding the Law of 8 November 1967 (88/1967).

This Law has been completed by the following Royal Decrees:

- Creation and composition of the Superior Council of Metrology (1615/1985),
- Metrological control (1618/1985 and 1616/1985),
- European Community metrological control (597/1988),
- Accreditation of metrological verification laboratories (1617/1985),
- Statement of National Standard Measurements of International System of Units (SI) (648/1994).

2 Legal units of measurement

The legal units of measurement in Spain are those of the International System of Units (SI) as established by the Conférence Générale des Poids et Mesures.

Units of measurements in use and their definition following international resolutions were covered by Royal Decree (1317/1989).

3 Instruments subject to legal control

At present, the following groups of instruments are regulated:

- cylindrical weights from 1 g to 10 kg (of medium accuracy class M_2),
- rectangular bar weights from 5 kg to 50 kg (class M_2),
- weights of accuracy classes E_1 , E_2 , F_1 , F_2 , M_1 from 1 mg to 50 kg,
- medical syringes of glass,
- medical non-reusable syringes of plastics,
- volumetric flasks, pipettes and burettes,
- clinical thermometers,
- taximeters,
- chronotachographs,
- speed meters,
- nonautomatic weighing instruments,
- automatic weighing instruments,
- water meters,
- electrical energy meters,
- gas meters,
- moisture meters for cereal grain,
- measuring assemblies for liquids other than water,
- pressure gauges, vacuum gauges and pressure-vacuum gauges,
- alcoholometers and hydrometers,
- ships'tanks.

4 Metrological control of quantities

The verification of the volume of certain liquids in prepackages and the verification of mass and volume of certain products in prepackages is made on the basis of the rules harmonized by the EC.

5 Services responsible for metrology

5.1 National service of legal metrology

The sole body in charge of metrology (delivering pattern approvals) is:

Centro Español de Metrología (CEM)
c/ Alfar, 2
28760 TRES CANTOS (Madrid)

Telephone: 34-1-807 47 00
Fax: 34-1-807 48 07

5.2 Local verification services

Spain is divided into seventeen autonomous regions and, according to the new administrative structure of the state, these regions will be able to carry out verification and inspection of certain types of measuring instruments.

5.3 Laboratories responsible for maintaining national measurement standards

The Centro Español de Metrología preserves the national measurement standards and makes the comparisons, approvals, evaluations and calibrations in accordance with the law or on request by manufacturers, importers or users.

In order to implement the provisions of Article 4 of the Law, the CEM has delegated the custody of the following national standards:

- Time and frequency - second (s) - Real Observatorio de la Armada,
 - Luminous intensity, - candela (cd) - Instituto Daza de Valdés,
- as stated in Royal Decree 648/1994.

5.4 Instrument calibration and evaluation systems

No information received.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

- The Weights and Measures Ordinance
- The Weights and Measures (Amendment) Act No. 7 of 1971
- The Weights and Measures (Amendment) Law No. 24 of 1974
- The Weights and Measures (Amendment) Act No. 19 of 1976
- The Weights and Measures Regulations of 1955
- The National Metric Conversion (Weights and Measures) Regulation of 1981
- The National Metric Conversion (Measures of Volume for Alcoholic Beverage) Regulation 14 of 1982.

Note: The laws which are asterisked will be replaced very shortly by a new law which will be titled "The Measurement Units, Standards and Services Law").

2 Legal units of measurement

Length: the metre

The yard = 0.9144 metre (exactly) is also legally recognized.

Mass: the kilogramme

The pound = 0.453 542 37 kg (exactly) is also legally recognized.

Time: the second

Temperature: the kelvin

Electrical current: the ampere

Illumination: the candela

Amount of substance: the mole

For the other legal units reference should be made to the schedule of Law No. 24 of 1974.

3 Instruments subject to legal control

Weights, measures, weighing and measuring instruments used for trade within the country.

4 Metrological control of quantities

The procedure for the control of prepackages are at present administrative and are in accordance with those of the European Community.

5 Services responsible for metrology**5.1 National service of legal metrology**

The Measurement Standards and Services Division
Department of International Trade
101 Park Road
COLOMBO 5

Telephone: 94-1-83 261
Telex 21908 COMECE CF

Pattern approval of weights, measures and weighing and measuring instruments is done by this Division. Calibration of measuring equipment for temperature, frequency, industrial metrology, illumination is also offered.

5.2 Local verification services

Enforcement is done directly by the Division through 24 regional offices except in the capital which has its own office, the work being supervised by the Division.

(*) Information collected in 1985. See also CIMET Directory, 1993.

5.3 Laboratories responsible for maintaining national measurement standards

Measurement Standards and Services Division
Department of International Trade
101 Park Road
COLOMBO 5

Other official laboratories:

The Testing Laboratory
Bureau of Ceylon Standards
Galle Road
COLOMBO 6

The Applied Physics Laboratory
C.I.S.I.R.
Buddhaloka Mawatha
COLOMBO 7

5.4 Instrument calibration and evaluation systems

No information received.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

Act 1992:1119, technical inspection. This act regulates notified bodies, accreditation by the Swedish Board for Technical Accreditation (SWEDAC), National Laboratories and obligation of the recognition of certain foreign test results. The Ordinance 1993:1065, gives SWEDAC the surveillance and the authority issuing regulations within this area.

Act 1992:1514, units of measurement, measurements and measuring instruments.

The Ordinance 1993:1066 gives SWEDAC the surveillance and the authority issuing regulations in the field of legal metrology. These regulations are published in SWEDAC's Code of Statutes (STAFS).

Exceptions are made for electrical energy meters and for water meters and thermal energy meters, which are under the surveillance of Els akerhetsverket (Swedish Electrical Safety Board) and Boverket (Swedish National Board of Housing, Building and Planning), Ordinances 1994:99 and 1994:100, respectively.

2 Legal units of measurement

The instruments subject to regulations shall be graduated in International System of Units (SI) (Ordinance 1993:1066 and STAFS 1993:11).

3 Instruments subject to legal control

Instruments for the measurement of volume and mass in commercial transactions of public nature - SWEDAC, Taximeters, odometers and tachographs - V agverket (Swedish National Road Administration), Electrical energy meters - Els akerhetsverket (Swedish Electrical Safety Board), Water meters and thermal energy meters - Boverket (Swedish National Board of Housing, Building and Planning).

4 Metrological control of quantities

The verification of prepackaged products by sampling - SWEDAC.

Exceptions are here made for prepackaged food products. Livsmedelsverket (Swedish National Food Administration) holds the responsibility for maintaining control of these products.

5 Services responsible for metrology

5.1 National service of legal metrology

Swedish Board for Technical Accreditation (SWEDAC)
Box 878
S-501 15 BOR AS

Telephone: 46-33-17 77 00
Fax: 46-33-10 13 92

5.2 Local verification services

Previously the Swedish government appointed particular bodies, National Testing Agencies, for testing and certification. The Swedish National Testing and Research Institute (SP) was the national testing agency for metrology. From 1 January 1994 anyone who has the necessary qualifications can apply to become accredited by SWEDAC for type approval and for initial and periodical verification of measuring instruments.

Sweden operates a mandatory verification procedure for all instruments that are subject to legal control. Initial and periodical verification can be performed by any body accredited for the task. Presently there are only two companies in Sweden accredited for initial and periodical verification, SP and Nordisk M tarekontroll AB. Initial verification can also be carried out by manufacturers that are subject to control by an accredited body.

5.3 Laboratories responsible for maintaining national measurement standards

For mechanical quantities except pressure, electrical dc and If quantities, temperature, optical, acoustical, time and frequency:

Swedish National Testing and Research Institute
Box 857
S-501 15 BOR AS

Telephone: 46-33-16 50 00

For pressure:

Flygtekniska Försöksanstalten
(Aeronautical Research Institute of Sweden)
Box 11021
S-161 11 BROMMA

Telephone: 46-8-759 10 00

For electrical high frequencies quantities:

FFV Aerotech AB
S-732 81 ARBOGA

Telephone: 46-589-80 000

For quantities in the field of ionizing radiation:

Statens Strålskyddsinstitut
(Swedish National Institute of Radiation Protection)
Box 60204
S-104 01 STOCKHOLM

Telephone: 46-8-729 71 00

5.4 Instrument calibration and evaluation systems

According to Ordinance 1993:1065, SWEDAC is empowered to accredit measurement laboratories for calibration work in their field of specialization.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

There are two kinds of quality assured calibration laboratories, National Laboratories (riksmätplatser), and Accredited Laboratories (ackrediterade laboratorier). The system of quality assured laboratories is administrated by SWEDAC.

A National Laboratory is an institution which within a specific metrological field has the best available resources, knowledge and experience. It is appointed by the government and has the ultimate responsibility for the quantity concerned and for calibrations at the highest level in Sweden. The National Laboratory is responsible for maintaining the national standards within its field of activity and maintaining them traceable to the internationally accepted definitions of units. This is done by calibration at the BIPM or at a foreign national metrological institution participating in the work of the relevant Consultative Committee of the CIPM. The National Laboratories are under the surveillance of SWEDAC.

An Accredited Laboratory can be an industrial enterprise, or a public or private institution. The accreditation, which is voluntary, is granted by SWEDAC, provided that the laboratory meets the requirements in STAFS 1994:1, which are based on EN 45001, particularly regarding suitability of the equipment, qualification of staff, and documentation of measurement methods and ISO/IEC Guide 25.

6.2 Legal and applied metrological activities in product certification

Sweden has had very few rules in respect of legal metrology. Most of them have arisen in order to protect consumers against inaccurate measurement, but with the EEA Agreement and Sweden's membership of the European Union Sweden must incorporate a large number of EC Directives. To date SWEDAC has issued provisions:

- relating to nonautomatic weighing instruments and inspection thereof (STAFS 1994:18),
- relating to measuring devices and inspection thereof (STAFS 1993:14 and 1994:20),
- relating to packaging sizes and inspection thereof and to inspection of information concerning quantities on prepackaged goods (STAFS 1993:18 and 1994:19).

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

The bodies which have been accredited by SWEDAC according to STAFS 1994:1, maintaining legal and applied metrological activities, shall have one of our granted quality systems. This system may be an ISO 9000 quality system, but it may well be another system.

1 Laws of metrology

The Federal Law on Metrology of 9 June 1977, amended 18 June 1993, regulates the legal units of metrology and their application, the organization of pattern approval and verification, the mandatory declaration of quantity and price in commercial transactions, and research work in metrology under the administration and responsibilities of the cantons.

2 Legal units of measurement

The Law of 9 June 1977 specifies the use of the International System of Units for all instruments subject to pattern approval and verification. It gives the Office of Metrology the duty to determine and disseminate sufficiently accurate values of these units. The Ordinance of 23 November 1994 on the units fixes the definitions, denominations and symbols of the units.

3 Instruments subject to legal control

The list of instruments subject to pattern approval and/or verification along with their metrological characteristics is laid down by the Federal Council. The law provides the possibility accepting foreign test results, certificates of conformity, type approvals and verifications.

The law refers in particular to instruments that are used:

- (a) for commercial transactions of goods and services,
- (b) in the sector of health and public security,
- (c) for official determinations of facts based on physical quantities.

The Ordinance of the Federal Council of 17 December 1984 on the Qualification of Measuring Instruments (under revision) specifies the administrative procedures.

Today the following instruments are subject to compulsory approval and verification if used in the fields (a), (b), or (c) mentioned above:

- instruments in the field of weighing, length and volume measurement,
- weights,
- instruments for measurement of density,
- electrical energy meters,
- heat meters,
- alcoholometers,
- refractometers for grape must,
- emission gas analyzers,
- sound level meters,
- measuring instruments for road traffic,
- dosimeters for ionizing radiation (verification only).

4 Metrological control of quantities

The Ordinance on Declarations of the Federal Council of 15 July 1970, now under revision, prescribes the labelling of prepackages and the surveillance of contents by sampling.

5 Services responsible for metrology

5.1 National service of legal metrology

Swiss Federal Office of Metrology (OFMET)
Lindenweg 50
CH-3084 WABERN

Telephone: 41-31-963 31 11
Fax: 41-31-963 32 10

Publications: OFMET info, technical prescriptions, instructions for verification personnel.

The competent authority in the field of public health is:

Swiss Federal Office for Public Health
Bollwerk 27
CH-3003 BERN

Telephone: 41-31-322 95 11
Fax: 41-31-311 67 06

with OFMET as expert for metrological aspects.

5.2 Local verification services

The metrological services of the cantons are directed by the Ordinance on the Verification Offices of 25 June 1980. At present there are 53 verification offices and three auxiliary bureaux.

Verification offices are located in every canton and the Principality of Liechtenstein (see *Registre des autorités et offices cantonaux des poids et mesures*, published by OFMET).

The verification officers, 62 for Switzerland and the Principality of Liechtenstein in 1994, depend on the cantonal administrations but have to follow the technical prescriptions issued by OFMET. Their training takes place during basic instruction courses (diploma), additional training at OFMET and during the practical service.

Furthermore, based on the Ordinance on Verification Laboratories, there are authorized laboratories for verification of electrical energy meters (43), gas meters (11), heat meters (10), dosimeters (2) and weights (2). Special and difficult tasks of verification are carried out by OFMET.

5.3 Laboratories responsible for maintaining national measurement standards

As national primary institute, OFMET is responsible for the determination and dissemination of the standard values of the units used in metrology.

5.4 Instrument calibration and evaluation systems

Evaluations of measuring instruments for approval is carried out by OFMET. The calibration of measuring instruments not subject to legal metrology is delegated to the Swiss Calibration Service (SCS) managed by OFMET. SCS, established in 1986, comprised 63 accredited laboratories in 1994. OFMET laboratories calibrate the standards of the verification and calibration offices and laboratories.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

Since 1991, OFMET has been in charge of all accreditations in Switzerland, i.e. of the calibration and testing laboratories, the certification and inspection bodies and interested verification offices. It operates through the Swiss Accreditation Service (SAS) which performs the necessary evaluations. Accreditations are performed in accordance with the valid European Standard of the 45000 series and based on the documents adopted by the competent European associations (EAL and EAC) and on SAS guidelines. Following an assessment by the SAS in cooperation with external experts, the director of OFMET delivers the accreditation after consulting the independent Accreditation Commission.

Standards of verification and calibration laboratories are traceable directly to OFMET, whereas the standards of testing laboratories and measuring instruments used in quality management systems' laboratories are traceable to accredited calibration laboratories.

6.2 Legal and applied metrological activities in product certification

Prepackages are regularly controlled by the local verification offices. On request, the competent authorities for weights and measures of the cantons deliver conformity certificates for prepackages.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

OFMET/SAS are responsible for the accreditation of certification bodies for quality management and the surveillance of certification activities in the framework of accreditation. They check that traceability is correctly achieved through accredited calibration laboratories.

1 Laws of metrology

- The Weights and Measures Act No. 20 of 1982 (currently under review).

The regulations are:

- Weights and Measures Regulations 1960 (currently under review),
- Sale of Goods Regulation of 1972 has been merged with the Weights and Measures Regulations which are currently under review.

2 Legal units of measurement

The International System of Units (SI) of the metric system, as defined in the first schedule of the Weights and Measures Act No. 20 of 1982.

There are also customary measures: the "Kibaba" which is equivalent to 1 litre and the "Pishi" which is equivalent to 4 litres. Both Kibaba and Pishi are used as dry measures of capacity.

3 Instruments subject to legal control

All weights, measures, weighing and measuring instruments in use for trade (trade as defined in Section 11 of the Weights and Measures Act 1982) are subject to legal control.

4 Metrological control of quantities

The laws and regulations relating to prepackaged products are in most cases in conformity with the OIML Recommendations. A few items for export, e.g. cashew nuts, to non-metric countries are packed according to requirements of buyers abroad.

5 Services responsible for metrology

5.1 National service of legal metrology

Weights and Measures Bureau
Ministry of Industries and Trade
P.O. Box 313
DAR ES SALAAM

Telephone: 255-86 40 46
255-86 48 08
Telex: 41689 INDIS

The Weights and Measures Bureau carries out:

- pattern approval and certification of new patterns of weighing and measuring instruments,
- maintenance of local standards and annual reverification of working standards maintained and used in various regional Weights and Measures Offices,
- calibration and recalibration of vehicle tanks (used for sale or transport of liquid fuel),
- compounding of certain Weights and Measures Offences mentioned in Section 46 of the Weights and Measures Act 1982,
- overall administration of the Weights and Measures Act 1982.

5.2 Local verification services

There is a regional Weights and Measures Office in each of the country's twenty regions.

These offices are staffed by Inspectors of Weights and Measures. They are responsible for enforcement of the Weights and Measures Act 1982 and the regulations. The duties of the officers are:

- maintenance of working standards,
- verification and reverification of all weights and measures in use for trade in their respective regions,
- inspection of trade premises for the purpose of ascertaining accuracy of instruments and prepackages,
- institution of proceedings against offenders in weights and measures cases.

5.3 Laboratories responsible for maintaining national measurement standards

Tanzania Bureau of Standards
P.O. Box 9524
DAR ES SALAAM

Telephone: 255-490 41
Telex: 41667

The Bureau's responsibilities with respect to legal metrology are stated in Section 4 of the Weights and Measures Act 1982, i.e. to procure and maintain the national standards of the kilogram and the metre.

5.4 Instrument calibration and evaluation systems

- Tanzania Bureau of Standards,
- Tanzania Zambia Railway Authority calibrates and recalibrates instruments used in its own laboratory,
- Tanzania Industries Research and Development Organization (TIRDO) performs calibration of electrical measuring instruments which are not subject to legal metrology,
- Nyumbu Military Research and Development Unit calibrates most equipment relevant to its needs.

6 Accreditation and certification systems

The Weights and Measures Bureau of Tanzania has legal powers on all weights, measures, measuring and weighing instruments in use for trade as well as prepackaged goods. There is no other body accredited to do the same. Thus this Bureau ensures and controls all commercial standards.

Other standards, such as those used in industries, are controlled by other relevant bodies, for example:

- (a) Tanzania Bureau of Standards (Product Quality Standards),
- (b) National Food Control Commission (Food Quality Standards),
- (c) Tanzania Food and Nutrition Centre (Food Quality Standards),
- (d) Chief Government Chemist Body (Chemistry Standards),
- (e) TCPA - Overseer of acceptable product standards fit for consumption by consumers, etc.

These bodies have their own certification scheme using their own set standards and also certain international standards.

1 Laws of metrology

The Federal Law on Units of Measurement and Measuring Instruments (*Official Bulletin of the SFRY*, No. 9/84 and No. 53/91) is valid in the Republic until the enactment of an appropriate Act which will provide conditions for establishing a state institution, the Bureau of Measures and Precious Metals.

The implementation of the Law on Units of Measurement and Measuring Instruments and the Law on Control over Precious Metal Objects comes under the authority of the Department of Measures and Precious Metals established at the Ministry of the Economy.

The Department of Measures and Precious Metals has the authority to enact the following metrological regulations:

- Decree on determination of types of measuring instruments subject to compulsory pattern evaluation and examination,
- Decree on the time limits for periodic verification of standards and measuring instruments,
- Handbook of provisions for pattern approval examination of measuring instruments,
- Decree on types and forms of stamps and other marks and on the contents and shape of the certificates for the correct performance of measurement standards used at the examination of measuring instruments (*Official Bulletin of the Republic*, No. 81/91),
- Provisions concerning the fixed-rate payment for examination of types of measuring instruments, measurement standards, samples of reference materials and measuring instruments (*Official Bulletin of the Republic*, No. 84/92, No. 58/93 and No. 45/94).

This law and related by-laws are available from the address given in Section 5.1.

2 Legal units of measurement

The use of the International System of Units (SI) and some additional units is established by the Law on units of measurement and measuring instruments.

3 Instruments subject to legal control

The Decree on determination of types of measuring instruments subject to compulsory pattern evaluation and examination sets out the types of measuring instruments subject to compulsory examination of type and control, except if used for scientific and research purposes, as educational aids for individual purposes, or as indicators.

Measuring instruments used in the health service, protection of people and property, in calculation, and for quality control in calculation are subject to compulsory examination of type and control, including instruments to determine length, area, volume, volume flow of fluids (gas, water, fuel and similar), mass, density (volume mass and concentration), time, frequency, speed, power and hardness, pressure, viscosity, heat and electric power, electric current, voltage, resistance, capacity, magnetic inductivity, magnetic flux, strength of magnetic field, temperature, photometric and radiometric quantities, absorbed and exposure doses to ionization rays, sound pressure.

The Department of Measures and Precious Metals inspects the correct performance, sale and use of measuring instruments and units of measurement within the Republic, inspects compliance with the prescribed conditions by the authorized (accredited) and approved (service) laboratories, and implements administrative measures. The inspection and administrative measures are regulated by a special section of the Law.

The market inspections, according to the Law, also supervise the implementation of the legal provisions regarding the validity of the stamp and certification of the correct performance of measuring instruments used in sales of goods and services.

4 Metrological control of quantities

The Decree on determination of types of measuring instruments subject to compulsory pattern evaluation and examination covers metrological control of quantities (volume and mass) of packed products, as well as machines for dosage, filling and packing of products.

5 Services responsible for metrology

5.1 National service of legal metrology

The Department of Measures and Precious Metals at the Ministry of the Economy also acts as a state service for legal metrology within the Republic.

Ministry of the Economy
Department of Measures and Precious Metals
Samoilova 10
91000 SKOPJE

Telephone: 389-91-22 47 74
Fax: 389-91-23 19 02

The tasks of the Department of Measures and Precious Metals derive from the Law on Units of Measurement and Measuring Instruments. They are:

- realization, conservation, and use of the (primary) standards, providing traceability to international standards,
- provisions for the uniformity of measurement and coordination activities with all entities in the field of metrology,
- issue of regulations on the metrological conditions for testing laboratories for measuring instruments in production or under repair and metrological conditions for accredited (authorized) and approved (service) laboratories,
- coordination of metrological regulations with the International Recommendations issued by the OIML,
- evaluation and approval of patterns for measuring instruments,
- evaluation and certification of the metrological performance of imported measuring instruments,
- metrological examination, supervision, stamping of measurement standards, working instruments and reference materials.

The Department for Measures and Precious Metals is organized in two sectors: sector for control and inspection and sector for metrological development and metrological laboratories.

5.2 Local verification services

No regional or local verification services are foreseen within the present organization of the state service for legal metrology.

5.3 Laboratories responsible for maintaining national measurement standards

Legally, the primary standards are under the exclusive authority of the state institution for legal metrology. Secondary and working standards can be realized, kept and maintained also by other entities in the national metrological system.

5.4 Instrument calibration and evaluation systems

Legally, a system of approved metrological laboratories was established and placed at the disposition of the state institution for legal metrology.

Specific entities in the national metrological system which use measuring instruments for price calculation, such as water, electricity, heat and gas suppliers, must establish and approve (service) relevant laboratories.

Authorized (accredited) laboratories may repair and calibrate measuring instruments and standards, as alternative facilities are lacking in this field of metrology. These laboratories are also used by the Department of Measures and Precious Metals for the evaluation of types of measuring instruments.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The system for the accreditation of metrological laboratories is under the authority of the Department for Measures and Precious Metals which issues relevant decisions on the basis of the Law on Units of Measurement and Measuring Instruments.

The sector for metrological development and metrological laboratories directs activities to establish compliance with the required conditions to achieve the status of accredited laboratory or service.

The calibration of measuring instruments can be performed in metrological laboratories of two types, as indicated in the previous item.

Traceability of standards at the metrological laboratories is normally assured by comparing them with the standards of foreign metrological services, due to the lack of state standards within the Republic.

6.2 Legal and applied metrological activities in product certification

The system for product certification within the Republic comes under the authority of the sector for standardization. This system, for the time being, comprises the laboratories that were founded by the former Bureau for standardization of the SFRY, mainly in the field of civil engineering and the textile industry.

The legal metrology activity within this system is undertaken by the Department for Measures and Precious Metals by certifying the measuring instruments used by the laboratories.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

Even though there are legal regulations on the acceptance of ISO 9000 and the possibility of introducing this system in the Republic, no production process has yet been certified in accordance with this standard.

Educational programmes have been established and studies initiated at two university scientific institutions for the training of the personnel required to implement ISO 9000.

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1 Laws of metrology

Tunisian legislation on metrology is governed by the following regulations:

- Law No. 92-117 of 7 December 1992 concerning consumer protection,
- Decree of 29 July 1909 concerning verification and manufacture of weights and measures, weighing and measuring instruments, amended by the decrees of 10 March 1920, 1 January 1942, and 23 October 1952, which constitutes the essential basis for the Tunisian regulations in the field of weights and measures. The principal provisions of this decree:
 - establish and define functions of the weights and measures service,
 - determine conditions of acceptance for verification and stamping of weights, measures, weighing and measuring instruments,
 - establish obligations of subordinates, manufacturers and repairmen,
 - determine taxes for verification and stamping,
 - foresee administrative and juridical sanctions,
- Decree of 23 January 1895 concerning the use of the metric, decimal system and establishing legal measures, amended by decrees of 25 August 1922 and 9 March 1950,
- Decree of 20 April 1910 concerning measurement of dry materials and use of weighing instruments,
- Decree of 26 December 1911 fixing value of metric carat of 0,2 gram,
- Decree of 29 January 1912 concerning use of carat weights,
- Decree of 10 May 1930 concerning general conditions of acceptance of measuring instruments for verification and stamping,
- Decree No. 86-481 of 12 April 1986 fixing the right to collect taxes for initial and periodic verification of weighing and measuring instruments,
- Decree No. 88-1299 of 27 June 1988 relative to importation and exportation of measuring instruments,
- Order of 20 June 1930 relative to verification and usage of fuel dispensers,
- Annual Order of Minister of National Economy concerning verification and stamping of weights and measures,
- Order of 7 April 1994 on administrative work made by relevant services of Ministry of National Economy and conditions of granting this work.

However, it is worth noting that a draft law on metrology was elaborated within the framework of updating this legislation. This draft, in the process of completion, is aimed at facilitating unification of requirements at national level and its harmonization with international recommendations. This draft aims to:

- define legal units of measurement and establish conditions for their use,
- organize, define and establish conditions for state metrological control,
- determine conditions of manufacture, repair, import, export, sale, possession and use of measuring instruments,
- define tasks incumbent on executive bodies.

2 Legal units of measurement

Units of measurement in Tunisia comprise:

(a) Units of the International System of Units (SI) which are applicable:

- for measuring instruments subject to state control;
- for indication of quantities and sizes or in reports on these quantities if they are expressed in units of measurement:
 - in commercial transactions, in fields of health, public safety, in standardization, and in education,
 - in acts, contracts and other official documents deriving from public authorities, state and private bodies and physical persons charged with public tasks,
 - on goods, packages or containers.

(b) Units which are outside of the SI system but are used as customary units or in defined events.

3 Instruments subject to legal control

Measuring instruments locally manufactured or imported should be submitted to legal control during their use or if they are intended for use:

- in commercial transactions, fiscal and postal operations, determination of wages or prices, service charge, distribution of products or goods, setting values of articles, determination of quantity of products,
- in juridical expertise or official usage,
- in fields of public health and technical safety.

Legal metrological control consists of:

- pattern approval,
- initial verification,
- periodic verification,
- special control: gauging and marking of storage and transport tanks for liquids, calibration, evaluation and acceptance of testing means and equipment,
- metrological supervision.

4 Metrological control of quantities

The Legal Metrology Service undertakes metrological control of quantities (mass, volume, prepackages). This type of control is accomplished by checking in order to determine correctness of quantities stated on packing or containers having prepacked goods.

Instruments used for quantity determination should be verified and stamped by the Legal Metrology Service.

5 Services responsible for metrology

5.1 National service of legal metrology

The central service charged with state metrological control is:

Sous-Direction de la Métrologie Légale
1, rue Lavoisier
1000 TUNIS

Telephone: 216-1-240 020
Fax: 216-1-240 272

This service is attached to the Ministry of National Economy and it comprises:

- a service of mandatory metrological control,
- a service of research and calibration.

The principal tasks attributed to this service are:

- elaboration and setting in operation general metrological policy,
- elaboration of regulations on metrology and following their implementation,
- organization and guidance of programmes for verification, calibration and metrological supervision,
- verification of weighing and measuring instruments and calibration of capacity measures.

5.2 Local verification services

The Legal Metrology Service has at its disposition regional verification bodies attached to the Regional Office of National Economy and situated in the governorates of Tunis, Ariana, Bizerte, Béja, Nabeul, Sousse, Kairouan, Monastir, Sfax, Gabès and Gafsa.

In addition to these permanent bodies, the service has temporary bodies which are used in tours of periodic verification throughout the territory.

5.3 Laboratories responsible for maintaining national measurement standards

National standards of mass, volume and length are in the possession of the Legal Metrology Service.

Other laboratories have the custody of secondary standards of electrical, temperature, pressure and force quantities.

5.4 Instrument calibration and evaluation systems

A calibration system is under consideration; there are, however, bodies (laboratories, technical centres, services of enterprises) which can carry out calibration for their own needs or for a third party.

Other projects concerning the creation of primary laboratories for electrical and linear quantities have been under consideration since 1992.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards

The national system for accreditation of certification bodies, control bodies and testing and calibration laboratories designated the "Organization of conformity assessment" was created in June 1994. The National Council of Accreditation was also established.

Criteria and procedures for accreditation of conformity assessment bodies are in the process of elaboration.

National standards are traceable to foreign secondary standards, and standards of regional verification bodies to national standards.

6.2 Legal and applied metrological activities in product certification

Imported measuring instruments are subject to technical systematic control or certification.

Measuring instruments subject to state control should be approved in the country of manufacture or be granted an OIML certificate and accepted in that capacity by the Legal Metrology Service.

Measuring instruments produced in this country should be approved and stamped by the Legal Metrology Service before their sale.

It should be noted that the national mark of conformity to standards is applied to certain categories of measuring instrument after examination on the site of their manufacture as to various stages of production, a system of self-control and available testing means. This authorization for marking of the national sign "م ت" of conformity is issued by the National Institute of Standardization and Industrial Property by the appropriate committee and on request.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

The Legal Metrology Service carries out on request verification and calibration of measuring instruments within the framework of certification of enterprises in conformity with ISO 9000 or accreditation of testing laboratories.

A system of control by quality assurance methods is under consideration, to be applied by the Legal Metrology Service to verification of certain categories of measuring instrument, namely electrical energy meters and water meters.

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1 Laws of metrology

Weights and Measures Act 1985.

The regulations are issued as ministerial decrees known as Statutory Instruments; the following being of particular interest to metrologists:

- SI 1978/238 The Weights and Measures (Solid Fuel) Regulations,
- SI 1978/1962 The Cubic Measures (Sand, Ballast and Agricultural Materials) Regulations, as amended by SI 1988/765,
- SI 1983/914 The Weighing Equipment (Beltweighers) Regulations,
- SI 1983/1390 The Measuring Equipment (Liquid Fuel Delivered from Road Tankers) Regulations, as amended by SI 1986/1210,
- SI 1983/1656 The Measuring Equipment (Intoxicating Liquor) Regulations, as amended by SI 1984/273,
- SI 1986/1082 The Units of Measurement Regulations,
- SI 1986/1320 The Weighing Equipment (Filling and Discontinuous Totalising Automatic Weighing Machines) Regulations,
- SI 1986/1682 The Measuring Equipment (Measures of Length) Regulations, as amended by SI 1986/2109,
- SI 1986:1683 The Weights Regulations,
- SI 1986/1684 The Weights and Measures (Local and Working Standard Linear Measures) Regulations,
- SI 1986/1685 The Weights and Measures (Local and Working Standard Weights and Testing Equipment) Regulations, as amended by SI 1991/1775,
- SI 1986/2049 The Weights and Measures (Packaged Goods) Regulations, as amended by SI 1987/1538, SI 1992/1580 and SI 1994/1258,
- SI 1988/120 The Capacity Serving Measures (Intoxicating Liquor) Regulations, as amended by SI 1993/2060,
- SI 1988/128 The Measuring Equipment (Liquid Fuel and Lubricants) Regulations,
- SI 1988/876 The Weighing Equipment (Nonautomatic Weighing Machines) Regulations, as amended by SI 1988/2120, SI 1991/2019 and SI 1992/3037,
- SI 1988/997 The Measuring Equipment (Cold-Water Meters) Regulations,
- SI 1990/2626 The Weights and Measures (Local and Working Standard Capacity Measures and Testing Equipment) Regulations,
- SI 1992/1579 The Nonautomatic Weighing Instruments (EEC Requirements) Regulations.

Gas and electricity meters and taximeters are covered by separate legislation.

Laws and Statutory Instruments may be obtained from the following address:

HMSO Publications Centre
PO Box 276
LONDON SW8 5DT

Telephone: 44-171-873 00 11
Fax: 44-171-873 82 00

or through Overseas Agents of HMSO.

These laws apply in Great Britain. Northern Ireland has its own separate legislation.

2 Legal units of measurement

Length: the yard (yd) and the metre
(1 yard = 0.9144 m exactly.)

The commonly used sub-multiples foot and inch are related as follows: 1 yard = 3 feet = 36 inches.

Mass: the pound (lb) and the kilogram
(1 pound = 0.453 592 37 kg exactly.)

The use of the imperial ton (= 2240 pounds) is no longer authorized, but the metric tonne is an authorised unit for trade.

The commonly used sub-multiple ounce (oz) relates as follows:

1 pound = 16 ounces.

Volume (dry): the cubic metre (m³) and metric sub-multiples.
(The use of cubic yard, foot or inch is no longer authorized.)

Liquid capacity: the UK gallon and the litre.
(1 gallon corresponds to 4.54609 dm³ or litres.)

The commonly used sub-multiples are related as follows:
1 gallon = 4 quarts = 8 pints = 32 gills = 160 fluid ounces.

Other legal units: see Statutory Instrument 1986 No. 1082, as amended.

Legislation currently being produced will end the use for trade of most of the above imperial units from 1 October 1995, other than as supplementary indications. The main exceptions to this are the pound and the ounce for the sale of goods loose from bulk (e.g. sales of fresh fruit and vegetables) which may be used until 1 January 2000, and the pint for dispensing draught beer and cider and for milk in returnable containers for which no time limit has been specified. For details, see SI 1994/1851.

Conversion factors of units are published in *Changing to the metric system - Conversion factors, symbols and definitions*, by P. Anderton and P.H Bigg, NPL, Her Majesty's Stationery Office, London, 1979.

3 Instruments subject to legal control

- weighing machines, instruments for measuring volume of certain liquids and for measuring length used for trade within the country,
- alcoholometers and hydrometers for alcoholic liquors,
- instruments for measuring the flash point of flammable liquids,
- cold-water meters,
- gas meters,
- electrical energy meters.

Exported instruments are not subject to mandatory legal control.

4 Metrological control of quantities

The laws, regulations and control of prepackaged products conform to EC Directives.

5 Services responsible for metrology

5.1 National service of legal metrology

National Weights and Measures Laboratory (NWML)
Stanton Avenue
TEDDINGTON
Middlesex TW11 OJZ

Telephone: 44-181-943 72 61
Fax: 44-181-943 72 70

The NWML carries out pattern approval examination of instruments used for trade. The verification of individual instruments is usually the responsibility of the local government authorities. The NWML also ensures that physical reference standards used in the weights and measures laboratories of the local government authorities are within statutory limits of tolerances and carries out, on request, certified calibrations of instruments for the measurement of mass, length, area and liquid volume or capacity which directly or indirectly are used for trade (or when required for export).

The NWML also calibrates hydrometers for alcohol and apparatus used for the determination of the flash point of flammable products. The NWML employed in 1994 a total staff of 48 including 29 engineers, scientists and technicians.

Publications of the NWML:

- National Weights and Measures Laboratory*, (a description of the laboratory facilities and capabilities).
- Type Examination and Consultancy at NWML - Guidance and Requirements*, 1994 (a guide to follow when applying for pattern approval).
- International Scene* (OIML, WELMEC and EEC news)
- NWML Now* (general news from the NWML)
- Memoranda for the guidance of Inspectors of Weights and Measures*, produced monthly (information and instructions for verification officers), a charge of £ 24 per year is made for these memoranda.

Gas meters:

Gas and Oil Measurement Branch
Department of Trade and Industry
3 Tigers Road (off Saffron Road)
Wigston
LEICESTER LE8 2UX

Telephone: 44-116-278 53 54
Fax: 44-116-277 00 27
Telex: 342457

The Branch is responsible for administration of national gas testing, i.e. the gas quality and the gas metering regulations. It also administers the relevant EC Directives for gas meters. The Branch is responsible for agreeing gas and oil production metering systems under production licenses given under petroleum legislation.

Electricity Meters:

Office of Electricity Regulation
Hagley House
Hagley Road
Edge baston
BIRMINGHAM B16 8QG

Telephone: 44-121-456 21 00
Fax: 44-121-456 46 64

The legal metrology authority for electricity meters in Great Britain is the Director General of Electricity Supply, who is responsible for the Examining Service.

The Examining Service is responsible for the pattern approval and certification (verification) of meters. It is also responsible for resolving disputes that may arise between customers and suppliers concerning the quantity of electricity supplied. The Examining Service participates in the preparation of national and international standards for electricity meters and ancillary equipment.

Legislation concerning the use of electricity meters is contained in the Electricity Act 1989, Schedule 7. Copies of this Act can be obtained from Her Majesty's Stationery Office, as can the following Statutory Instruments relating to electricity meters:

- SI 1987/730 The Meters (Certification) Order,
- SI 1990/791 The Meters (Approval of Pattern or Construction and Method of Installation) Regulations,
- SI 1990/792 The Meters (Certification) Regulations.

The following publications are available from the Examining Service:

- *Directions as to the Apparatus to be used for the Regulating and Testing of Electricity Meters,*
- *Directions as to the Sealing of Electricity Meters.*

5.2 Local verification services

The enforcement of regulations concerning weighing and measuring equipment used for trade is the responsibility of local government authorities which are administratively independent. This duty is only part of the activities of Trading Standards Departments, who control the quality, quantity, price, credit and safety of goods and services, both for the protection of consumers and to ensure a fair trading environment which is conducive to assisting business. In Northern Ireland enforcement is the responsibility of the Trading Standards Branch of the Department of Economic Development.

The verifications are conducted by Trading Standards Officers. The total number of Trading Standards Officers in Great Britain in 1990 was about 1 500. There are currently 129 independent local administrations and there are approximately 338 local verification offices.

The local authority usually comprises either the Council of a County (in rural areas) or the Council of a City or Metropolitan District (in urban areas) or Scottish Regions.

Publications:

The Trading Standards Review, published by:

The Institute of Trading Standards Administration (ITSA)
4/5 Hadleigh Business Centre
351 London Road
Hadleigh, ESSEX SS7 2BT

PADS data base, CD-ROM based, contains UK pattern approval certificate information and WM memoranda. For more information, contact the Head of Information Services, ITSA Ltd, at the above address (telephone: 44-170-255 99 30).

5.3 Laboratories responsible for maintaining national measurement standards

National Physical Laboratory (NPL)
Queens Road
TEDDINGTON
Middlesex TW11 OLW

Telephone: 44-181-977 32 22
Fax: 44-181-943 21 55
Telex: 262 344 NPL G

The activities of the NPL are described in the brochure: *Points of Contact*.

Information on the calibration capabilities of the NPL may be obtained from the Library and Information Services at the above address.

Other official laboratories carrying out work within the framework of the activities of the OIML:

National Engineering Laboratory
East Kilbride
GLASGOW G75 OQU

Telephone: 44-135-522 02 22
Fax: 44-135-523 69 30

(work in the field of liquid volume measurements, in particular water meters).

5.4 Instrument calibration and evaluation systems

The National Measurement Accreditation Service (NAMAS) which is based at the National Physical Laboratory, has accredited over 1600 laboratories (in 1994) in government, industry, educational institutions and other administrations to carry out specific calibrations and tests which are traceable to national measurement standards.

6 Accreditation and certification systems

No information received.

1 Laws of metrology

In the United States, both federal and state laws on weights and measures apply. The federal commercial weights and measures laws concern particular products or groups of products and supersede state laws. The federal laws on commercial trade, public and worker health and safety, and protection of the environment are contained in the US Code of Federal Regulations.

At the state level, each state enacts its own laws and regulations that cover all commercial weights and measures including those matters covered by federal law. This permits the states to enforce legal requirements on all weights and measures matters.

This decentralized structure and application of commercial weights and measures led to the establishment of the National Conference on Weights and Measures (1905), sponsored by the National Institute of Standards and Technology (NIST), formerly the National Bureau of Standards. This Conference produces model laws and regulations (NIST Handbooks 44 and 130) which are incorporated in the legislation of each State. The models are compatible with all federal laws and thus a high degree of uniformity prevails.

2 Legal units of measurement

The United States is signatory to the Convention du Mètre (1875). The international metre and kilogram are the fundamental standards of the nation. The US customary (inch-pound) system of weights and measures is defined in terms of the metre and kilogram as follows:

Length: 1 yard = 0.9144 m exactly,

Mass: 1 pound (avoirdupois) = 0.45359237 kg exactly.

The use of the customary system is provided for in federal and state law; the use of the metric system is authorized by federal and state law.

Information on units, systems, and tables of weights and measures is included in NIST Handbook 44 *Specifications, Tolerances and Other Technical Requirements for Commercial Weighing and Measuring Devices*. In order to assist conversion to SI units, the federal government now specifies its purchases in SI units, and the Federal Fair Packaging and Labeling Act was revised to require metric (SI) units on consumer packages.

3 Instruments subject to legal control

In general, all instruments or measuring systems for weighing or measuring in commercial transactions are subject to legal control. The legal control over devices is largely exercised by the states. The types of devices are those covered in NIST Handbook 44.

Other instruments, such as gas and electrical energy meters, instruments used in health care and protection, etc., may also be subject to regulation by governmental agencies other than the weights and measures service.

4 Metrological control of quantities

The Uniform Packaging and Labeling Regulation serves as the basis for individual state legislation and has been adopted in most states. It is updated annually and has been made fully compatible with the Federal Fair Packaging and Labeling Act and all other Federal laws having to do with the subject. It serves as the basis for individual state legislation and has been adopted in most states. The text is included in NIST Handbook 130, *Uniform Laws and Regulations*. NIST Handbook 133, *Checking the Net Content of Packaged Goods*, has been adopted by federal and state agencies.

5 Services responsible for metrology

5.1 National service of legal metrology

At the federal level, the main authority in matters of commercial weights and measures is:

Weights and Measures Program
National Institute of Standards and Technology
GAITHERSBURG
MD 20899-0001

Telephone: 1-301-975 40 04
Fax: 1-301-926 06 47

The NIST is responsible for the distribution and calibration of the physical reference standards used by each state (state standards). Also, the NIST provides the secretariat for the National Conference on Weights and Measures, and therefore provides technical and administrative assistance to the National Conference in the drafting of model laws and regulations. The NIST publishes annual editions of NIST Handbooks 44 and 130 and periodically publishes other handbooks on laboratory and field procedures.

5.1.1 National Type Evaluation Program

The National Type Evaluation Program is operated by the NIST in cooperation with the National Conference on Weights and Measures, the states, and the private sector for determining, on a uniform basis, the compliance of a "type" of device or system with the relevant provisions of NIST Handbook 44. The evaluations are conducted on a fully cost-reimbursable basis. If the device or system meets all of the requirements, the NIST issues a Certificate of Conformance, copies of which are sent to the manufacturer and to each state.

The evaluation is the first step of this regulatory process. Further steps include initial and subsequent verification by the states of the production devices or systems manufactured in compliance with the "type" described in a Certificate of Conformance. The "type" evaluation process is conducted at the NIST, in four state laboratories, and one federal laboratory authorized by the NIST. The authorized state laboratories are in California, Maryland, New York and Ohio. The federal laboratory other than the NIST is in the Federal Grain Inspection Service of the US Department of Agriculture. The USA and Canada mutually recognize each other's type evaluation tests in certain types of device.

5.1.2 OIML Coordination

A separate office within the NIST has the responsibility for all OIML activities, and manages US representation and participation under the terms of the Convention of the Treaty. The manager of the programme is the US member of the International Committee of Legal Metrology (CIML). Information on the NIST programme may be obtained from:

The Standards Management Program
Office of Standards Services
National Institute of Standards and Technology
GAITHERSBURG
MD 20899-0001

Telephone: 1-301-975 40 23
Fax: 1-301-963 28 71

5.2 Local verification services

Each state has one or more regulatory bodies in the field of weights and measures. In many states, these bodies are in the departments of agriculture. Some states have local enforcement bodies at the county and city levels. A directory of these bodies is available from the NIST Weights and Measures Program (see Section 5.1). The Weights and Measures Program accredits State Weights and Measures Laboratories in mass, volume, length, and temperature.

5.3 Laboratories responsible for maintaining national measurement standards

For all physical quantities:

National Institute of Standards and Technology
GAITHERSBURG
MD 20899-0001

The following publications by the NIST have contents of particular interest to metrologists:

- *NIST Journal of Research* (bi-monthly; scientific),
- *NIST Monographs* (papers on specific scientific and technical subjects),
- NIST Handbooks (recommended methods and codes of practice of interest to industry, professional organizations or legislative bodies),
- NIST Special Publications (Reports of Conferences and in particular of the National Conference of Weights and Measures, catalogues of publications, bibliographies, etc.)

5.4 Instrument calibration and evaluation systems

The NIST sponsors the National Type Evaluation Program (NTEP) for commercial evaluation only. In addition, the NIST has a programme for producing and marketing Certified Reference Materials.

Information on calibrations and standard reference materials may be obtained from:

Office of Measurement Services Technology Services National Institute of Standards and Technology Physics Building, Room B 354 GAITHERSBURG MD 20899-0001	Telephone: 1-301-975 48 61 Fax: 1-301-948 38 25
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A great number of metrology laboratories (about 500) are members of an Association called the National Conference of Standards Laboratories (NCSL). Its aims are to solve problems common to calibration laboratories, in particular, by organizing symposia and training courses. The NIST is a member of the NCSL. Information about these activities may be obtained from:

National Conference of Standards Laboratories (NCSL) Suite 305 B 1800 30th Street BOULDER CO 80301	Telephone: 1-303-440 33 39 Fax: 1-303-440 33 84
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5.5 Areas outside traditional commercial weights and measures services

In the United States, the responsible authorities for non-traditional metrology services, such as occupational health and safety, medical applications, and pollution measurement and control, exist in various federal and state departments and agencies. Information on specific US national regulations (standards) in these areas may be obtained from:

National Center for Standards and Certification Information (NCSCI) TRF Building, Room A 163 National Institute of Standards and Technology GAITHERSBURG MD 10899	Telephone: 1-301-975 40 40 Fax: 1-301-926 15 59
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6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards.

Within the United States, many sectors of the economy look to laboratory accreditation and related efforts to provide some assurance of the technical proficiency and competence of an entity to assess compliance of a product or service with a set of prescribed standards. Requirements and assessment criteria vary by programme and according to the product, system, or service being assessed. Federal, state, local and city governments have various laboratory accreditation programmes as well as private-sector professionals and trade organizations.

One such federal programme, the National Voluntary Laboratory Accreditation Program (NVLAP) at the NIST, is applicable to calibration and testing laboratories seeking accreditation based on compatibility with international standards. The programme activities are operated in conformance with ISO/IEC Guides 58 and 25. Accreditation is available to commercial, manufacturer's in-house and university laboratories, and to federal, state and local government facilities. Foreign-based laboratories may also be accredited under the programme. Information on the NVLAP may be obtained from:

National Voluntary Laboratory Accreditation Program TRF Building, Room A 162 National Institute of Standards and Technology GAITHERSBURG MD 20899-0001	Telephone: 1-301-975 40 42 Fax: 1-301-926 28 84
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Ordering information on the following NIST publications on US accreditation activities may be obtained from the NCSCI (see Section 5.5 for address):

- *Laboratory Accreditation in the United States* (NIST IR 4576),
- *Directory of Federal Government Laboratory,*
- *Accreditation/Designation Programs* (NIST SP 808),
- *Directory of State and Local Government Laboratory,*

- *Accreditation/Designation Programs* (NIST SP 815),
- *Directory of Professional/Trade Organization Laboratory*,
- *Accreditation/Designation Programs* (NIST SP 831).

6.2 Legal and applied metrological activities in product certification

In the United States, the Trade Agreements Act of 1979 implemented US acceptance of the Standards Code of the General Agreement on Tariffs and Trade (GATT). Title IV of the Act specifies obligations for the federal government, including responsibilities with regard to certification. Moreover, the federal government is required to take reasonable measures to assure compliance with the requirements of the Act by state governments and the private sector.

There are many private sector organizations which engage in product certification activities. The US Department of Commerce maintains at the NIST the National Center for Standards and Certification Information (NCSCI) which serves as a centre for information on standards, specifications, and related materials and serves as a resource for information on certification programmes and activities. Information on this subject as well as on the following publications are available from the NCSCI (see Section 5.5).

- *The ABC's of Certification Activities in the United States* (NBS IR 88-3821),
- *Directory of Federal Government Certification Programs* (NBS SP 739),
- *Directory of Private Sector Product Certification Programs* (NIST SP 774).

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

The ISO 9000 standard series was implemented in the United States through development of the ANSI/ASQC (American National Standards Institute/American Society for Quality Control) Q 90 Series and later changed to the ANSI/ASQC Q 9000 Series when the 1994 editions of the series were adopted. The ANSI is the US member organization of the ISO and, through its National committee, of the IEC. Interest in quality improvement has become the focus of many federal, state and local governmental agencies and a key business strategy among companies. For example, a federal agency, such as the US Food and Drug Administration's Center for Medical Devices and Radiological Health is in the process of harmonizing its Good Manufacturing Practices guidelines with a supplemented version of ISO 9001, and the Department of Defense has adopted the ANSI/ASQC Q 90 Standard Series for use as appropriate. The interest these standards have generated throughout the public and private sector has resulted in an increase in the number of US-based organizations offering quality system registration. In 1989 the Registrar Accreditation Board (RAB) was established as an affiliate of the ASQC to develop a programme to evaluate the quality of services offered by registrars. The RAB was later incorporated within the American National Standards Institute (ANSI).

The NIST Standards Code and Information Program has been designated to serve as the clearing house for the dissemination of federal agency activities related to the ISO 9000 series. Information on federal activities may be obtained from the NCSCI (see Section 5.5).

1 Laws of metrology

The Law on Units of Measurement and Measuring Instruments was adopted in 1994. This Law regulates all the matters relating to metrology (units, standards and reference material samples, pattern evaluation and examination of measuring instruments, supervision of the fulfilment of the legal provisions, metrological regulations for measuring instruments, accreditation for verification of some patterns of measuring instruments, etc.).

The following detailed regulations are issued on the basis of the Law:

- Decree on periodic verification of standards and measuring instruments, and on the determination of types of measuring instruments subject to pattern evaluation and verification,
- Decree on types and forms of seals and other marks, which are used in verification of measuring instruments, and on contents and form of verification certificates for measuring instruments,
- Rules of procedure for pattern evaluation of measuring instruments.

A number of other regulations (on metrological requirements for individual patterns of measuring instruments, etc.), are published in the *Official Gazette* of the FRY.

2 Legal units of measurement

In Yugoslavia the use of the International System of Units (SI) is compulsory. Some units out of the International System of Units as set out in the Law on Units of Measurement and Measuring Instruments, are permitted, but with possible limitations in the field of utilization.

3 Instruments subject to legal control

The Decree on periodic verification of standards and measuring instruments, and on determination of types of measuring instruments subject to pattern evaluation and verification, concerns measuring instruments of length, surface, volume, mass, electric and heat energy, etc. In general, all measuring instruments used in the field of health care and protection of people and property, as well as those used for transaction purposes, and quality control in transactions, are subject to compulsory control.

4 Metrological control of quantities

The Decree on periodic verification of standards and measuring instruments, and on determination of types of measuring instruments subject to pattern evaluation and verification, contains a list of measuring instruments used for defined products (among them are prepackaged products). They are, for example: weighing machines for prepackaged products, bottle-filling machines (for milk, alcohol, etc.). Net content is defined according to standards, and control of prepackaged products is carried out by market inspection.

5 Services responsible for metrology

5.1 National service of legal metrology

Matters of legal metrology are the responsibility of:

Federal Bureau of Measures and Precious Metals (FBMPM)
Mike Alasa 14
11000 BELGRADE

Telephone: 381-11-3282 736
Fax: 381-11-18 1668

The FBMPM performs the following tasks:

- realization, conservation, and use of Yugoslav primary standards and reference material samples,
- pattern evaluations and issue of approvals,
- elaboration of metrological requirements (if available, based on International Recommendations), and metrological regulations on individual measuring instruments,
- accreditation of laboratories for control of certain patterns of measuring instrument, and inspection of their activities,
- supervision of the fulfilment of legal provisions,
- development of legal metrology in Yugoslavia, and other activities in the field of legal metrology.

Publication: *Glasnik* (quarterly review of metrological regulations, pattern approvals, laboratory accreditation, etc.)

5.2 Local verification services

The FBMPM has eight regional services for measures and precious metals (Measures Control Units), located in the following cities: Belgrade, Podgorica, Novi Sad, Prizren, Niš, Kruševac, Zrenjanin and Subotica. The examination of measuring instruments used in the field of health care and for the protection of people and property, as well as those used for transactions and quality control in transactions, is normally carried out by these Measures Control Units.

5.3 Laboratories responsible for maintaining national measurement standards

The Yugoslav primary standards are realized, conserved and maintained in the FBMPM.

5.4 Instrument calibration and evaluation systems

The law covers all measuring instruments. Working standards are calibrated in the FBMPM, and in accredited laboratories. Certificates issued by these accredited laboratories are official. Legally, control of measuring instruments used in the production process (generally in industry) must be carried out by users of these instruments.

6 Accreditation and certification systems

6.1 Accreditation systems for legal metrology, calibration and testing laboratories - Traceability to national, regional, international or foreign measurement standards.

The Law on Units of Measurement and Measuring Instruments regulates the accreditation system for metrological laboratories, prescribes a few types of laboratory for which particular metrological regulations exist, defining requirements and criteria for laboratory accreditation. Accredited laboratories may be authorized to examine working standards, reference material samples and certain categories of measuring instrument which are not used for transaction purposes or protection of people and property, on the basis of:

- Rules of procedure for authorization of enterprises and other legal subjects by the FBMPM for examining working standards, reference material samples and measuring instruments,
- Rules on requirements for personnel qualifications, equipment and working premises which are to be fulfilled by enterprises and other legal subjects authorized to examine working standards, reference material samples and measuring instruments,
- Decree on working standards and measuring instruments, and reference material samples to verify which enterprises and other legal subjects may be authorized.

There were seventy such laboratories in 1994 concerned with various fields of metrology. Laboratories for verification of measuring instruments located at manufacturers or repairers of measuring instruments, where Measures Control Units examine measuring instruments, work on the basis of:

- Rules of procedure for regional offices of the Federal Bureau of Measures and Precious Metals which verify measuring instruments.

There were over 350 such laboratories in 1994. There are also laboratories located at manufacturers of measuring instruments which may be authorized for initial verification of measuring instruments in mass production if their production and examination process is automated, i.e. to guarantee the fulfillment of prescribed metrological conditions.

All measuring laboratories are subject to permanent supervision by the FBMPM, and standards from those laboratories are regularly examined and verified, so that traceability to national standards, and consequently to international or foreign standards, exist.

6.2 Legal and applied metrological activities in product certification

Measuring instruments used in the production process may be periodically or compulsorily examined in the laboratory of the manufacturer, if he maintains corresponding working standards examined by the FBMPM, or by an accredited laboratory, and corresponding metrological regulations. Measuring instruments used in the production process may also be examined directly in accredited laboratories.

6.3 Legal and applied metrological activities in ISO 9000 quality management systems

The main metrological activities in the ISO 9000 quality system are based on calibration, and special attention is paid to all types of accredited laboratories which, together with the FBMPM ensure the traceability of every measuring instrument or measurement to national standards. Seminars for training of metrological experts are also organized for this purpose.

1 Laws of metrology

The Weights and Measures Act No. 22 of 1994 and Regulations. This is a new Act that repeals the Weights and Measures Act Cap 697 and the Metrication Act No. 710.

The process of drafting new Regulations to cover the following areas is continuing:

- The Weights and Measures Act (Assize Fees Regulations) regulates the fees charged for testing, weighing and measuring instruments,
- The Weights and Measures Act (Assize Regulations) regulates the verification of weighing and measuring instruments,
- The Weights and Measures Act (Sale of Articles Regulations) controls the sale of articles by weight or measure,
- The Weights and Measures Act (Standards Regulations) lays down errors on the standards and the periodic verification,
- The Weights and Measures Act (Certificate of Competency Regulations) lays down the procedure relating to the examination of instrument mechanics and competency in repair of instruments,
- The Weights and Measures Act (Assize Certificate Regulations) lays down the qualifications of the Assizers (Inspectors).

The current Act exempts the following instruments from control:
gas meters, water meters, electricity meters, taximeters, egg grading machines.

2 Legal units of measurement

The International System of Units (SI) is the sole legal system for legal metrology applications in Zambia.

3 Instruments subject to legal control

- weighing instruments and weights,
- vehicle tankers,
- measures of length and capacity,
- fabric measuring instruments,
- bulkmeters,
- petrol pumps,
- precision instruments.

All new and modified instruments are subject to pattern approval by the Assize Department.

4 Metrological control of quantities

The Weights and Measures Act (Sale of Articles Regulations) provides controls on the packaging of commodities for sale to the public and establishes that some articles have to be packed in specified quantities. However, land dealings are exempt from control.

5 Services responsible for metrology

5.1 National service of legal metrology

Ministry of Commerce
Assize Department
P.O. Box 30989
LUSAKA

Telephone: 260-1-236 062
Telex: 45630 COMIND ZA
Telegram: Assize (Lusaka)

5.2 Local verification services

The head office is in Lusaka, the capital, address as in Section 5.1. There are three regional offices at Chipata (Eastern Region), Ndola (Northern Region), Choma (Southern Region).
There are plans to set up an office at Mongu for the Western Region.

5.3 Laboratories responsible for maintaining national measurement standards

Zambia Bureau of Standards
Assize Department

Primary and national standards are maintained by the Zambia Bureau of Standards at the laboratory in Lusaka, while local standards and working standards are kept by the Assize Department in Lusaka and at regional offices.

5.4 Instrument calibration and evaluation systems

The Assize Department is responsible for calibration and issue of certificates relating to all trade instruments submitted for verification to its offices.

6 Accreditation and certification systems

No information received.

OTHER DIRECTORIES ON METROLOGY

EUROMET Directory, 1995 (Metrology in European countries)

Secretariat:
Danish Institute of Fundamental Metrology
Building 307, Lundtoftevej 100
DK-2800 Lyngby
Denmark
Tel: 45-45-93 11 44
Fax: 45-45-93 11 37

WELMEC Directory, 1995 (Legal metrology in European countries)

Published by LACOTS
PO Box 6
1 A Robert street
Croydon, CR9 1LG
United Kingdom
Tel: 44-181-688 19 96
Fax: 44-181-680 15 09

COOMET Directory, Part 1 - 1993, Parts 2 and 3 - 1994 (Metrology in central and eastern European countries)

Secretariat:
Slovak Institute of Metrology
Karloveská 63
842 55 Bratislava
Slovakia
Tel: 42-7-72 98 20 and 42-7-72 98 65
Fax: 42-7-72 95 92 and 42-7-72 23 76

APLMF Directory, 1995 (Legal metrology in the Asia Pacific region)

Secretariat:
Asia-Pacific Legal Metrology Forum
PO Box 282
North Ryde, New South Wales 2113
Australia
Tel: 61-2-888 39 22
Fax: 61-2-888 30 33

CIMET Directory, 1993 (National measurement system of Commonwealth countries)

Secretariat:
Coordinator CIMET
National Physical Laboratory
Dr. K.S. Krishnan Road
New Dehli 110 012
India
Tel: 91-11-574 30 05
Fax: 91-11-575 26 78
Telex: 031-77384 RSD IN

APMP Directory, in preparation (Calibration facilities in the Asia Pacific region)

Secretariat:
Asia Pacific Metrology Programme (APMP)
Dr B. Inglis - Convenor, APMP
CSIRO
Division of Applied Physics
P.O. Box 218
Lindfield, NSW 2070
Australia
Tel: 61-2-413 74 60
Fax: 61-2-413 73 83

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