Asia-Pacific
Economic Cooperation

Asia-Pacific
Legal Metrology Forum

Handbook on
Mechanical Weighing Scales

APEC/APLMF Training Courses in Legal Metrology
(CTI 25/2007T)
September 25-28, 2007
Ho Chi Minh City, Viet Nam

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November 2007

Train the Trainer Course on the Verification of Mechanical Weighing Scales
September 25 – 28, 2007

Photos taken at the training course in Ho Chi Minh City, Viet Nam

Contents

Foreword

This booklet is one of outcomes of the APEC Seminars and Training Courses in Legal Metrology titled 'Train the Trainer Course on the Verification of Mechanical Weighing Scales' which was held on September 25-28, 2007 at the Rex Hotel in Ho Chi Minh City, Viet Nam. This course was organized as a follow-up of the past training course on Non Automatic Weighing Instruments, yet this time we put focus on the mechanical weighing instruments. This training course was, again, arranged as one of the APEC TILF projects, CTI-25/2007T. This training course was organized by APLMF and supported by (1) Directorate for Standards and Quality (STAMEQ) and (2) National Metrology Institute of Japan (NMIJ). Having this result, I would like to extend my sincere gratitude to all the staffs of STAMEQ and two speakers from NMIJ. Also, special thanks should be extended to the APEC Secretariat for their great contributions.

We have conducted the survey among the APEC member economies concerning seminar and training programs in legal metrology to find their needs as well as possible resources available in the region. The survey showed that there is still a strong need for repeating training course on Non-Automatic Weighing Instruments especially emphasized on the practical training on verification on mechanical weighing scales which are widely used in the member economies. Regardless of its heavy use, the legal metrology on mechanical scales has not been well established in developing economies. We looked at this point and determined to serve for the members' demand.

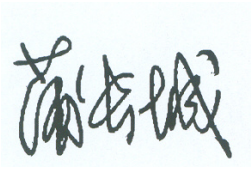
The target of this training course was the experts in charge of verification on mechanical weighing instruments in the APEC/APLMF member economies. The main objective was to experience and learn the actual operation of verification on the instruments by hands-on exercise. The contents of the training course were based on the procedures practiced in Japan which are complied with the international standard recommended by OIML. Also, the training provided an opportunity to share and compare information on the method and status of verification being done in participated economies.

In this view, this training course gave a sure basis of confidence in verifying the highly demanded instrument in the APEC/APLMF member economies. I would like to say that this is certainly a valuable step to fruitful activities in legal metrology related to mechanical weighing instruments in the Asia-Pacific region.

I am really pleased to have this outcome from the seminar and again deeply appreciate the

APEC Secretariat's generosity in contributing to the development in legal metrology among the APLMF member economies.

November 14, 2007



Mr. Pu Changcheng
APLMF President

Summary Report

According with the rapid growth of the globalization of international trade, the compliance to the international recommendation OIML R76 has become a major issue for the APLMF member economies in the field of non-automatic weighing instruments (NAWI), which is one of the most important categories of instruments in legal metrology. In order to accommodate such trend, the APLMF Working Group on Training Coordination chaired by Mrs. Marian Haire of Australia has given much effort in organizing a number of training courses in the last few years.

However, the R76 as well as the past training programs put much focus on electrical weighing instruments and did not give much consideration to the mechanical weighing scales regardless of its heavy use in the member economies. This area is in which our members are interested for the training course. To respond to such demand, the Working Group determined to organize the fist training course designed only for mechanical scales. From the area of specialty, Mr. Kazuo Neda and Mr. Tsutomu Horikoshi of the National Metrology Institute of Japan (NMIJ) determined to serve as trainers for this training course.

Based on such background, the Train the Trainer Course on the Verification of Mechanical Weighing Scales was held from September 25th to 28th, 2007 at the Rex Hotel in Ho Chi Minh City, Viet Nam. As you can see in the title, the course put emphasis on verification procedure and aimed to train the future trainers who would lead in training programs in their home economies. This training course was jointly organized by APEC and APLMF with supported by the Directorate for Standards and Quality (STAMEQ) in Viet Nam and National Metrology Institute of Japan (NMIJ), AIST.

A total of 36 trainees including 20 local trainees attended this course from the following 15 economies: Cambodia, Chile, PR China, Hong Kong China, Indonesia, DPR Korea, Malaysia, Mexico, Mongolia, Peru, Philippines, Singapore, Chinese Taipei, Thailand and Viet Nam. In addition, many staff from the STAMEQ, Quality Assurance and Testing 3 (QUATEST3) and Nhon Hoa Spring Scale Manufactory Co. Ltd. in Ho Chi Ming City contributed to the course. From the Secretariat, Dr. Tsuyoshi Matsumoto of NMIJ and Mr. Li Jinsi of Beijing Institute of Metrology in PR China attended the course.

On Tuesday the 25th, the training course started off with the opening ceremony. Dr. Ngo Quy Viet, Director General of STAMEQ welcomed all participants with his opening address and send them words of encouragement. After his speech, Dr. Matsumoto as the APLMF Executive Secretary gave an address. After the opening ceremony, each economy delivered a short presentation about the current situation on the verification of NAWI including mechanical scales in their economy. Then, Mr. Neda gave the lectures starting with the basic understandings of mechanical weighing scales. In the evening, the host provided a welcome dinner at the factory of the Nhon Hoa Spring Scale Co. in Ho Chi Minh City.

On Wednesday the 26th, Mr. Neda continued his lectures on technical requirements for mechanical weighing scales based on the OIML R76. In the afternoon, practical training on each verification test item was conducted in groups of eight using brand new mechanical scales provided by the host economy accompanied with set weights. All trainees worked very hard on each activity under the instruction by Mr. Neda and Mr. Horikoshi and enthusiastically threw many questions.

On Thursday the 27th, all participants continued the practical training in the morning. After the practice, Mr. Neda gave a lecture on test methods for verification practiced in Japan as an example.

In the afternoon, all participants left the hotel by bus prepared by the host and visited the testing center of QUATEST3 located in suburb of Ho Chi Minh City. At the testing center, they were impressed by the advanced facilities for verification and calibration in several fields of metrology. After the visit to QUATEST3, they also visited a factory of the Nhon Hoa Spring Scales Co. also in Ho Chi Minh City. This company is one of the largest manufacturers of mechanical scales in Viet Nam. At the factory, they leaned all procedure of mechanical spring scales production. In the evening, APLMF provided a farewell dinner at the Cung Dinh Restaurant in the Rex Hotel. The delegates and assistant staffs from the host economy were also present the dinner.

On Friday the 28th, each of the eight groups demonstrated what they leaned by using a scale and an overhead projector in reply to the several assignments given by the trainers. After the demonstrations, the closing ceremony was held. Certificates of completion were granted to all 36 trainees from Mr. Tran Van Dung, Director of QUATEST3 who represented the host economy. The ceremony was closed with remarks from Mr. Tran and Dr. Matsumoto.

On departure of the trainees for home, they were granted a CD-ROM that contains text books, reports from the trainees and photos taken during the course. These materials are also available on the APLMF member's website.

Finally, the Secretariat would like to give our sincere and deepest gratitude to the hard work and dedication by the staffs of the STAMEQ represented by Dr. Ngo Quy Viet, QUATEST3 represented by Mr. Tran Van Dung, and Nhon Hoa Spring Scale Manufactory Co. Ltd. represented by Mr. Ly Sieng. In addition, we greatly appreciate the dedicated efforts by the two trainers, Mr. Neda and Mr. Horikoshi who provided well prepared lectures and materials with kind care for all trainees. Also, we can never forget the tremendous support from the Secretariat of Asia-Pacific Economic Cooperation (APEC) although their representatives could not attend this training course.

APLMF Secretariat

Asia-Pacific Economic Cooperation

Asia–Pacific Legal Metrology Forum

APEC/APLMF Seminar and Training Courses in Legal Metrology

(CTI-25/2007T)

Train the Trainer Course on the Verification of Mechanical Weighing Scales

September 25-28, 2007

at the Rex Hotel in Ho Chi Minh City, Viet Nam

Program

Organizers:

- Asia-Pacific Economic Cooperation (APEC)
- Asia-Pacific Legal Metrology Forum (APLMF)

Supporting Organizations:

- Directorate for Standards and Quality (STAMEQ)
- National Metrology Institute of Japan (NMIJ),
  National Institute of Advanced Industrial Science and Technology (AIST)

Trainers:

- Mr. Kazuo Neda
  Director, Legal Metrology Division, National Metrology Institute of Japan (NMIJ)
- Mr. Tsutomu Horikoshi
  Legal Metrology Division, National Metrology Institute of Japan (NMIJ)

Registration:

- Fill the attached **Registration Form** and send it to the APLMF secretariat by **August 31**. Please also reply the **type of mechanical scales** commonly used in your economy using this form. This information will be very important to organize the training course effectively.

Venue and Accommodation:

- **Venue**
  Rex Hotel
  141 Nguyen Hue, District 1, Ho Chi Minh City, Vietnam
  Tel: (84-8)8292185, Fax: (84-8)8296536
  http://www.rexhotelvietnam.com/

- **Accommodations**
  The accommodation will be prepared at the Rex Hotel with the rates below. If you hope to reserve the accommodation, please fill and send the separated **Hotel Reservation Form** to the host by **September 7**.

Superior:	USD90.00/single	– USD 100.00/double
Deluxe:	USD100.00/single	– USD 110.00/double
Rex Suite:	USD115.00/single	– USD 130.00/double

  (Above rates include breakfast, 10%VAT and 5% service charge)

- **Access Information:** The Rex Hotel is ideally located in the center heart of Ho Chi Minh City next to the People Committee House within steps of the famous Ben Thanh Market and historical Opera House. The hotel is 7 km - 20 minutes drive from Tan Son Nhat Airport. The fare of the airport taxi is around 7-10 USD or 100.000 -150.000 VND (Vietnam Currency) one way to the Rex Hotel depending on the traffic situation.

Travel Support:

- **APEC travel support**, composed of a roundtrip airfare in a discount economy class and per diem including accommodation, would be prepared for the participants from **Chile, PR China, Indonesia, Malaysia, Mexico, Papua New Guinea, Philippines, Peru, Russian Federation and Thailand**.
- **APLMF travel support** would be complementary prepared for the non-APEC and full-APLMF member economies; **Cambodia, DPR Korea and Mongolia**.
- The maximum number of supported participants is limited to **one** for each economy. The final eligible participants will be decided after an approval by the APEC/APLMF secretariat. All supported participants are required to prepare a presentation with a document during the course.
- The candidates of the **APEC support** will be requested to submit an airfare quotation and itinerary in advance and have to wait to buy air ticket until it is approved by the APEC secretariat. Basically, all payment will be reimbursed directly from APEC after the **travel is finished**. The supported participants have to pay their airfare and accommodation temporarily by themselves until the reimbursement.

Visa Assistance:

- If you need visa to enter Vietnam, fill the **bottom part** of the **Registration Form** and send it to the secretariat. This information will be forwarded to the host in Vietnam and they will provide an invitation letter.

Presentation from each economy:

- At least **one trainee** from each economy will be requested to provide a **brief presentation** about the legal metrology system on non-automatic weighing instruments including mechanical scales in his/her economy. The **recommended topics** of the presentation are given below.

  1 Self introduction
    1.1 Explain about your organization and department.
    1.2 Explain your professional experience in your organization.

  2 Non Automatic Weighing Instruments (NAWI) in your economy
    2.1 What are the major purposes or targets to use NAWI?
    2.2 How many manufacturers of NAWI are there in your economy?

2.3 If you know, please mention approximate total number of production of NAWI.
2.4 If you know, please mention approximate ratio (%) of numbers in use for the (a) electronic weighing scales, (b) mechanical scales using a spring, and (c) mechanical balances using a weigh beam and weights.
2.5 What are the accuracy class and the maximum capacity, which are most commonly used?

3 Legal metrology system in your economy
3.1 Who implements the measurement law (government, metrology institute, verification body, testing laboratory, etc.)?
3.2 Describe briefly the types of weighing instruments and its measuring range, which are covered by the measurement law.
3.3 Are initial verification and re-verification required? If yes, which organization performs the verification? How long is the re-verification period? How much verification is performed in a year? Are they increasing or decreasing?
3.4 Are type approvals required? If yes, which organization performs the type approvals? How many type approval tests are performed in a year?

4 Explain current situation in your economy about the compliance to the international standards / recommendations, such as OIML R76?

5 Are there any other requirements from your economy? Do you have any problems in order to implement the legal metrology system (budget, human resources, etc.)?

Contact Persons about the Training Course:

- **APLMF Secretariat** (lecture, registration and travel support)
  Dr. Tsuyoshi Matsumoto and Ms. Ayako Murata
  NMIJ/AIST Tsukuba Central 3-9, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan
  Tel: +81-298-61-4362
  Fax: +81-298-61-4393
  E-mail: e.sec@aplmf.org, sec@aplmf.org

- **Host in Vietnam** (visa assistance, accommodation, venue and access information)
  Mr. Trinh Minh Tam
  International Cooperation Department
  Directorate for Standards & Quality (STAMEQ)
  No 8, Hoang Quoc Viet Rd, Cau Giay, Hanoi, Vietnam
  Tel: +84-4-7911-633
  Fax: +84-4-7911-605
  E-mail: htqt@tcvn.gov.vn

Program

Day 1 **Sept. 25** **Tuesday**	9:00 - 9:30	**Opening ceremony:** · Welcome address by Dr. Ngo Quy Viet, Director General of STAMEQ · Opening address by Dr. Tsuyoshi Matsumoto, APLMF Executive Secretary · Take a group photo
	9:30 - 10:00	*Coffee Break*
	10:00 - 12:30	**Presentation from the economies:** · Each participant provides a brief presentation of the legal metrology system on non-automatic weighing instruments including mechanical scales.
	12:30 - 14:00	*Lunch Break*
	14:00 - 15:40	**Basic understandings of mechanical weighing scales presented by Mr. Neda:** · Production of mechanical weighing scales in Japan · Legal metrology system for weighing scales in Japan
	15:40 - 16:10	*Coffee Break*
	16:10 - 17:00	· Understandings of principle, structure and influence factors
	18:00	*Leave the hotel by bus for the dinner*
	19:00 - 20:30	*Welcome dinner hosted by STAMEQ at the Nhon Hoa Spring Scale Manufactory at 516-518, 13th Road, Hiep Binh Phuoc, Thu Duc, Ho Chi Minh City*
Day 2 **Sept. 26** **Wednesday**	9:00 - 10:30	**Technical requirements for mechanical weighing scales based on the OIML R76 presented by Mr. Neda**
	10:30 - 11:00	*Coffee Break*
	11:00 - 12:30	Continue the lecture
	12:30 - 14:00	*Lunch Break*
	14:00 - 15:15	**Practical training participated by the trainees instructed by Mr. Neda & Mr. Horikoshi:** · Outline of the practical training · Training on verification test items: zero-setting, evaluation of instrumental error and repeatability
	15:15 - 15:45	*Coffee break*
	15:45 - 17:00	Continue the practical training.

Day 3 **Sept. 27** **Thursday**	9:00 - 10:30	**Practical training participated by the trainees instructed by Mr. Neda & Mr. Horikoshi (cont.):** · Training on verification test items: discrimination and eccentricity error
	10:30 - 11:00	*Coffee Break*
	11:00 - 12:00	**Test methods for verification as an example practiced in Japan presented by Mr. Neda**
	12:00 - 13:00	*Lunch Break*
	13:00	*Leave the hotel by bus*
	14:00 - 17:00	**Technical tour guided by the host to Ho Chi Minh City:** · Visit the Center for Quality Assurance and Testing 3 (QUATEST3) · Visit the Nhon Hoa Spring Scales Co. Ltd.
	18:00	*Back to the Rex Hotel by bus.*
	19:00 - 21:00	*Farewell dinner hosted by APLMF at the Cung Dinh Restaurant at the 1st floor of Rex Hotel*
Day 4 **Sept. 28** **Friday**	9:00 - 10:30	**Presentation with demonstration of test methods by the trainees instructed by Mr. Neda & Mr. Horikoshi** · Prepare for the presentation
	10:30 - 11:00	*Coffee break*
	11:00 - 12:30	· Presentation with demonstration in separated groups
	12:30 - 14:00	*Lunch Break*
	14:00 - 16:00	· Presentation with demonstration in separated groups (cont.)
	16:00 - 16:15	*Coffee break*
	16:15 - 16:50	**Closing ceremony:** · Presentation of certificates to all trainees · Closing address by Mr. Tran Van Dung, Director of QUATEST3 · Closing address by Dr. Tsuyoshi Matsumoto

Participants List:

APEC/APLMF Seminar on Mechanical Weighing Istruments (CTI-25/2007T)
Train the Trainer Course on the Verification of Mechanical Weighing Scales

No	Category	Economy	Name	Organization
1	Trainee	**Cambodia**	**Dr. Laim Kimleng**	Metrology Office, Department of Industry, Mines and Energy Sihanouk Ville, MIME
2	Trainee	**Chile**	**Mr. Mauricio Enrique López Guzmán**	Servicio Nacional del Consumidor (SERNAC), Government Consumer Protection Agency
3	**APLMF**	**People's Republic of China**	**Mr. Li Jinsi**	Senior Engineer, Beijing Institute of Metrology
4	Trainee	**People's Republic of China**	**Mr. Xuming Zhu**	Shanghai Institute of Measurement and Testing technology
5	Trainee	**Hong Kong China**	**Dr. Tran Chuong Hao**	Government Laboratory
6	Trainee	**Indonesia**	**Mr. Aripin Maskosuditro**	Directorate of Metrology
7	**APLMF**	**Japan**	**Dr. Tsuyoshi Matsumoto**	National Metrology Institute of Japan (NMIJ), AIST
8	**Trainer**	**Japan**	**Mr. Tsutomu Horikoshi**	National Metrology Institute of Japan (NMIJ), AIST
9	**Trainer**	**Japan**	**Mr. Kazuo Neda**	National Metrology Institute of Japan (NMIJ), AIST
10	Trainee	**Democratic People's Republic of Korea**	**Mr. Jon Song Il**	Central Institute of Metrology (CIM)
11	Trainee	**Democratic People's Republic of Korea**	**Mr. Om Tae Song**	Central Institute of Metrology (CIM)
12	Trainee	**Malaysia**	**Mr. Peter J. Berinus Agang**	Enforcement Division, Ministry Of Domestic Trade and Consumer Affairs
13	Trainee	**Mexico**	**Mr. Benjamin Corona Perez**	Procuraduría Federal Del Consumidor
14	Trainee	**Mongolia**	**Ms. Gandolgor Tsedenbaljir**	Mongolian Agency for Standardization and Metrology
15	Trainee	**Peru**	**Mr. Aldo Martin Quiroga Rojas**	National Metrology Service, National Institute for the Defense of Competition and Intellectual Property (INDECOPI)

16	Trainee	**Philippines**	**Mr. Rolly C. Medialdea**	National Metrology Laboratory Industrial Technology Development Institute
17	Trainee	**Singapore**	**Mr. Phang Long Hwa**	Weights Measures Office, SPRING Singapore
18	Trainee	**Chinese Taipei**	**Mr. Hung-Chang Huang**	Taiwan Accreditation Foundation (TAF)
19	Trainee	**Chinese Taipei**	**Mr. Bo-Chang Su**	Bureau of Standards, Metrology and Inspection (BSMI)
20	Trainee	**Thailand**	**Ms. Pattaraporn Surasit**	Central Bureau of Weights and Measure
21	Trainee	**Viet Nam**	**Mr. Bach Van Gioi**	Hoan My Company Ltd.
22	Trainee	**Viet Nam**	**Mr. Bui Chien Thang**	Quality Assurance and Testing Center 2
23	Trainee	**Viet Nam**	**Mr. Bui Van Ly**	Quality Assurance and Testing Center 2
24	Trainee	**Viet Nam**	**Mr. Dang Cong Luan**	Department for Standards and Quality of Ho Chi Minh City
25	Trainee	**Viet Nam**	**Mr. Dang Phong**	Nhon Hoa Company Ltd.
26	Trainee	**Viet Nam**	**Mr. Do Viet Hung**	Quality Assurance and Testing Center 3
27	Trainee	**Viet Nam**	**Mr. Hoang Cong Tri**	Quality Assurance and Testing Center 3
28	Trainee	**Viet Nam**	**Mr. Hoang Kim Cuong**	Quality Assurance and Testing Center 3
29	Trainee	**Viet Nam**	**Ms. Huynh Ngoc Lieu**	Quality Assurance and Testing Center 3
30	Trainee	**Viet Nam**	**Mr. Le Quoc Hung**	Quoc Hung Company LTD
31	Trainee	**Viet Nam**	**Mr. Le Trong Hiep**	Nhon Hoa Company Ltd.
32	Trainee	**Viet Nam**	**Mr. Le Van Nam**	Department for Standards and Quality of Ho Chi Minh City

33	Trainee	**Viet Nam**	**Mr. Nguyen Bao Chau**	Bao Toan Company LTD
34	Trainee	**Viet Nam**	**Mr. Nguyen Quoc Cuong**	Department for Standards and Quality of Dong Nai provine
35	Trainee	**Viet Nam**	**Mr. Nguyen Thanh Binh**	Nhon Hoa Company Ltd.
36	Trainee	**Viet Nam**	**Mr. Nguyen Thanh Tam**	Department for Standards and Quality of Ho Chi Minh City
37	Trainee	**Viet Nam**	**Mr. Nguyen Thuong Nhu**	Nhon Hoa Company Ltd.
38	Trainee	**Viet Nam**	**Mr. Nguyen Trung Thanh**	Quality Assurance and Testing Center 1
39	Trainee	**Viet Nam**	**Mr. Nguyen Viet Trieu**	Nhon Hoa Company Ltd.
40	Trainee	**Viet Nam**	**Mr. Vu Quoc Khoi**	Quality Assurance and Testing Center 3
41	**Host**	**Viet Nam**	**Mr. Dinh Van Tru**	Center for Quality Assurance and Testing 3 (QUATEST3), Directorate for Standards and Quality (STAMEQ)
42	**Host**	**Viet Nam**	**Dr. Ngo Quy Viet**	Directorate for Standards & Quality (STAMEQ)
43	**Host**	**Viet Nam**	**Dr. Ngo Tat Thang**	International Cooperation Department, Directorate for Standards & Quality (STAMEQ)
44	**Host**	**Viet Nam**	**Mr. Phan Quoc Dai**	Center for Quality Assurance and Testing 3 (QUATEST3), Directorate for Standards and Quality (STAMEQ)
45	**Host**	**Viet Nam**	**Mr. Tran Quy Giau**	Metrology Department, Directorate for Standards & Quality, STAMEQ
46	**Host**	**Viet Nam**	**Mr. Tran Van Dung**	Center for Quality Assurance and Testing 3 (QUATEST3), Directorate for Standards and Quality (STAMEQ)
47	**Host**	**Viet Nam**	**Mr. Ly Sieng**	Nhon Hoa Company Ltd.

* Names are listed in alphabetical order of their econmies and last names.

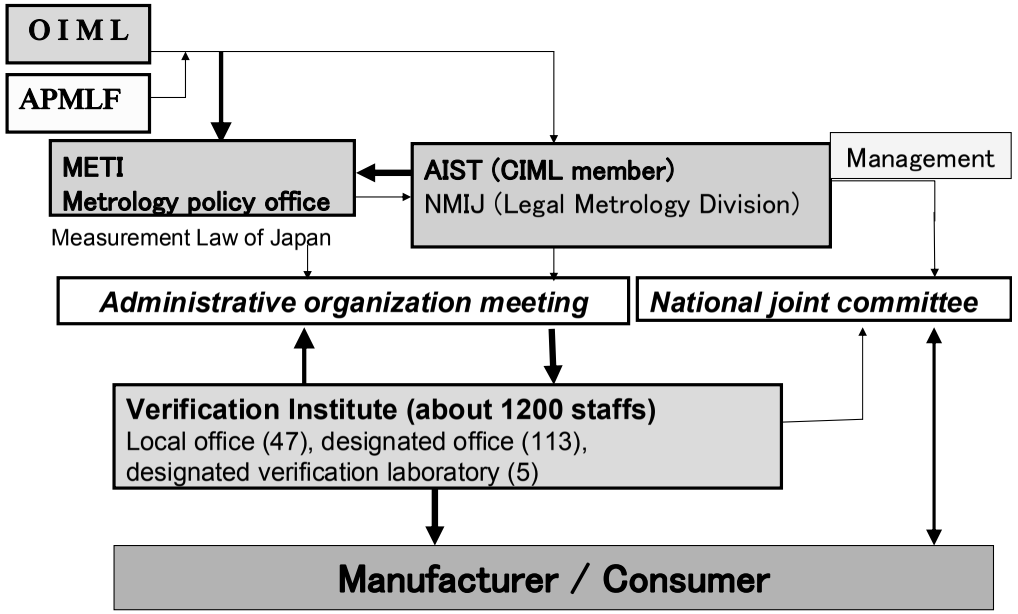
Basic understanding of mechanical weighing scales

Production of mechanical weighing scales and legal metrology system for weighing scales in Japan

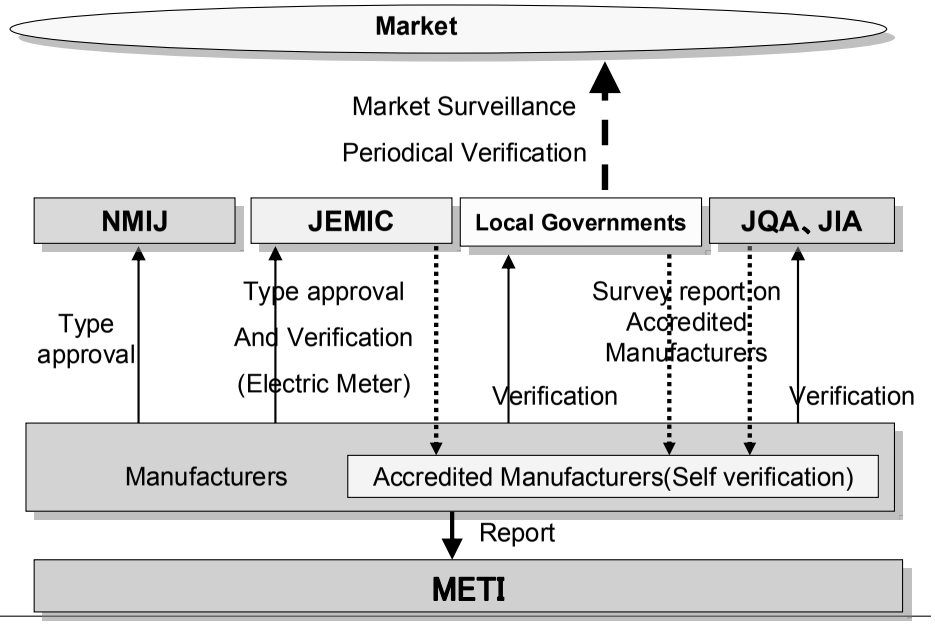
September 25,2007

1) Legal Metrology Organizations and Legal Metrology system in Japan
2) Verification
3) Periodic inspections
4) Inspection of verification standards
5) Household measuring instruments
6) Measuring Instrument Manufacturing Business
7) Measurement Certification Business System
8) Certified measurers
9) Proper measurement control business place
10) Designated Body System

Legal Metrology Organizations in Japan



Legal Metrology System



Legal Metrology Organizations

- National Institute of Advanced Industrial Science and Technology (AIST)
  - National Metrology Institute of Japan (NMIJ)
    - Metrology Institute of Japan
    - Metrology Management Center
      - International Metrology Cooperation Office,
      - Metrology Training Center, etc.

- Japan Electric Meters Inspection Corporation (JEMIC)
- Japan Quality Assurance Organization(JQA)
- Japan gas appliances Inspection Association(JIA)
- National Institute of Technology and Evaluation(NITE)
- Verification institutes

National Metrology Institute of Japan (NMIJ)

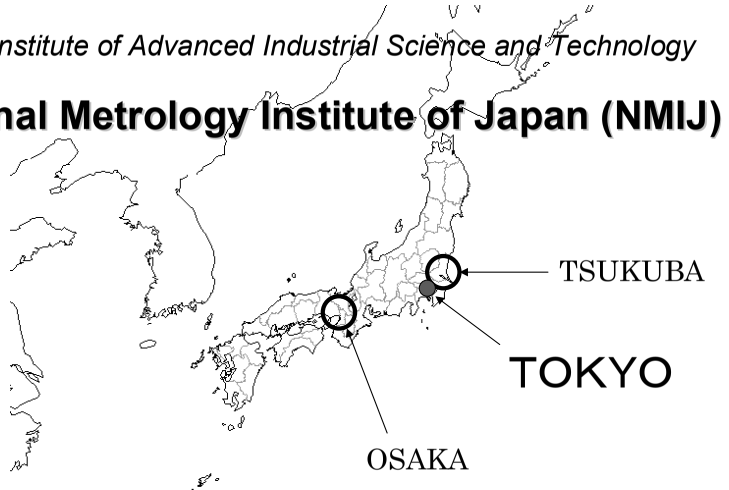
National Metrology Institute of Japan (NMIJ)

1. Metrology Institute of Japan: 300 staffs
   17 divisions

2. Metrology Management Center 50 staffs
   Metrology Planning Office
   Metrology Quality Office
   Reference Materials Office
   International Metrology Cooperation Office
   Metrology Training Center

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan (NMIJ)



National Metrology Institute of Japan (NMIJ)

Divisions engaged in legal metrology in NMIJ:
40 staffs in 7 divisions

- Legal Metrology Division
- Dissemination Technology Division
- Mechanical Metrology Division
- Fluid Flow Division
- Acoustics and Vibration Metrology Division
- Electromagnetic Waves Division
- Photometry and Radiometry Division

Legal Metrology Division

1. Issuing authority of Japanese type approval certificates

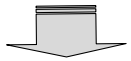
   - All categories of specified measuring instruments except for watt meters

2. Type approval testing laboratory
   - Taximeters
   - Aneroid pressure gauge
   - Aneroid pressure gauge which employ electric sensing elements
   - EMC tests

3. Designer of legal metrology system

Design of legal metrology system

- Preparation for Declaration of Mutual Confidence (DoMC) in OIML MAA: revision of regulations
- Implementation of management system conforming with ISO 17025
- Accreditation of manufacturers (self verification)



- Implementation of management system conforming with ISO 9000 series
- Development of methods for type evaluation of modules (e.g. Load cells for weighing instruments according to R60)
- Accepting test reports from subcontracted testing laboratories
- New regulations on prepackages (e.g. IQ mark system, e-marking)

Issues to be discussed

- Issuing authority of OIML Certificate of Conformity:
  to broaden the categories of measuring instruments

- Type evaluation on modules:
  Non-automatic weighing instruments (NAWI)
  Fuel dispensers for motor vehicles (FDMV)

- Accepting test reports from subcontracted testing laboratories
  (we do not subcontract type approval tests now)

- Revision of management systems of type evaluation and testing
  (ISO 17025, ISO Guide65)

Measurement Law of Japan

- Under the jurisdiction of:
  Metrology Policy Office
  in Ministry of Economy, Trade and Industry (METI)
- Scope:
  - Measurement Units: SI units
  - Legal control on Measuring instruments
  Type approval/Verification/inspection
  - Market surveillance: Net contents, inspection
  - Control on manufacturing /repairing/selling measuring instruments

The history of the Measurement Law

- Origin:
  Weights and Measures Codes : 701 (1300 years ago)
- Modern Measurement Laws:

Weight and Measures Law	1891
Measurement Law	1951
Measurement Law (major revision)	1966
Measurement Law (new edition)	1995

- Revision proposed:
  - in order to deal with OIML MAA
  - references to OIML new D1 and MID etc.

Scope of the Measurement Law

- Ultimate aim:
  - to contribute development of economy and cultural enhancement
- aim:
  - to establish the standards of measurement
  - to ensure proper execution of proper measurement

Regulations on measuring instruments

- The Measurement Law stipulates that measuring instruments should be used in business in which trades are based on measurements to ensure the proper measurement.

- The measuring instruments used in transaction or certification, or supplied mainly for the life of general consumers, and defined by Cabinet Order as those for which standards shall be set regarding their structure and error are called "specified measuring instruments".
  In order to ensure proper measurements, the specified measuring instruments are subject to verification, etc.

Verification and inspection

- In order to ensure proper measurements, the specified measuring instruments are subject to verification and periodical inspections.

- Verification
  Period of validity is specified:
  Taximeters, water meters, fuel dispensers, gas meters, watt-hour meters, etc.

  Period of validity is indefinite:
  Weights

- Periodic Inspection
  Non-automatic weighing instruments (once in every 2 years),
  Instruments for measuring the areas of leather (once a year)

Verification - 1

In principle, all specified measuring instruments are subject to a verification conducted by the ① National Institute of Advanced Industria1 Science and Technology (AIST), ②a prefectural government, ③Japan Electric Meters Inspection Corporation or ④a designated instrument certification organization to check their conformity to set technical standards in terms of construction and instrumental error.

In this regard, measuring instruments used in combination with other devices or systems,such as a taxi meter, which is fitted on a vehicle, and an electric meter, which is connected to transformer,are subject to a compulsory inspection conducted in installed state (equipment-mounted inspection of electric meter with transformer fitting inspection) to ensure their accuracy in their actual state of use, in addition to a certification examination.

Some specified measuring instruments have a specific validity period, while others don't have.

Verification - 2

Even in the latter case, however, those measuring instruments are subject to periodic inspections or fitting inspections as necessary to ensure accuracy if they are susceptible to fluctuations in performance or instrumental error due to the nature of their use.

- Specified measuring instruments with fixed validity period of verification
  Water meters, fuel oil meters, gas meters, watt-hour meters, noise meters, etc.

- Specified measuring instruments without fixed validity period of verification but subject to periodic inspections
  Non-automatic scales, balance weights, counterweights (with some exceptions) and leather area measuring machines

Verification - 3

- Specified measuring instruments without fixed validity period of verification but subject to fitting inspections (annual)
  Taximeters

- Specified measuring instruments without fixed validity period of verification
  Thermometers, exhaust gas/effluent current meters, exhaust gas/effluent flow meters, density measurement buoys, etc.

Specified measuring instruments (1)

Used in transaction

- Taximeters
- Non-automatic weighing instruments
- Fuel oil meters
  - Fuel dispensers for motor vehicles
  - Fuel oil meters for mounting on vehicles (For delivery of kerosene)
  - Stationary fuel oil meters
- Liquefied petroleum gas meters
- Hydrometers
- Instruments for measuring the areas of leather

Specified measuring instruments (2)

Utility meters

- Water meters D=350mm
- Gas meters D=250mm
- Heat meters D=40mm
- Hot water meters D=40mm

- Watt-hour meters
- Var-hour meters
- Maximum demand Watt-hour meters

Specified measuring instruments (3)

Environmental measurement Ⅰ

- Vibration level meters
- Illuminance meters
- Sound level meters
- Zirconia type oxygen analyzers
- Conductometric type sulfur oxide analyzers
- Magnetic type oxygen analyzers

Specified measuring instruments (4)

Environmental measurement Ⅱ

- Ultraviolet type sulfur oxide analyzers
- Ultraviolet type nitrogen oxide analyzers
- Non dispersive infrared type sulfur oxide analyzers
- Non dispersive infrared type nitrogen oxides analyzers
- Non dispersive infrared type carbon monoxide analyzers
- Hydrogen ion density detectors
- Hydrogen ion density analyzing indicators
- Nitrogen oxides analyzers

Specified measuring instruments (5)

Health and Safety

- Aneroid sphygmomanometer
- Glass type clinical thermometers
- Resistance type clinical thermometers
- Aneroid pressure gauge
- Aneroid pressure gauge
  which employ electric sensing elements

Periodic inspections

Prefecture governments, specified municipal governments and designated periodic inspection bodies conduct periodic inspection every other year for non-automatic weighing instruments, balance weights and counter-weights and once a year for leather area measuring machines.

A periodic inspection may be replaced by a commissioned inspection conducted by a certified measurer or a self-inspection in the case of a proper measurement control business place/measurement certification business.

AIST

Inspection of verification standards

Under the Measurement Law, measuring instruments used for verification, Periodic inspection and other instrument inspection purposes are subject to an inspection of verification standards, with those passing the inspection named verification standards.

In the past, a traceability system did not exist, and the inspection of verification standards system was used in the private sector as an alternative system. Coinciding with the overhauling of the Measurement Law in 1993, a traceability system was introduced, and the
application of inspections of verification standards has since been mainly limited to measuring instruments owned by public organizations.

AIST

Household measuring instruments

Although no verification obligation has been specified for household measuring instruments, such as health meters, manufactured /imported products must comply with the technical standards set by the Enforcement Regulations.

Household measuring instruments must not be sold, or displayed for sale unless they carry a compliance mark, verification mark, etc.

AIST

Measuring Instrument Manufacturing Business - 1

To ensure the supply of accurate measuring instruments, the Measurement Law requires the manufacturers of specified measuring instruments to file a notification (notified manufacturers).

Notification to be filed with the Minister of Economy, Trade and Industry via the prefecture government (directly with the minister in the case of electric meters)

Measuring Instrument Manufacturing Business - 2

A notified manufacturer may apply of a “type” with regard to measuring instruments manufactured by them, and in the event of obtaining “type approval”, will be exempted from “structure” inspection from verification (approved manufacturer).

A notified manufacturer with an outstanding quality control capability may obtain designation as a “designated manufacturer ” for each factory or other business site on application. With the designation provided, they go through a screening examination of their quality control practices.

A designated manufacturer is exempted from verification for their “type-approved specified measuring instruments” as long as they conduct self-inspections. [132/23/161. End of January 2007]

Measurement Certification Business System - 1

“Measurement certification” is a “certification” service provided by an independent party upon a request of a group who needs such a service for his measurement, and an organization who provides this service as the main line of business, which is called a measurement certification business. This service is required to be registered with the competent prefecture government for each of their business sites.

Measurement Certification Business System - 2

● Measurement certification business

- A business that provides a certification service for the measurement of length, mass, area, volume or heat (general measurement certification business)

Measurement certification designed upon unloading of cargo or moving cargo in/out of a warehouse for the purpose of transportation, consignment or sale (excluding loading and unloading of cargo on to or off a marine vessel)

- A business that Provides a certification service for the measurement of concentration, sound pressure level or oscillating acceleration level (environmental measurement certification business)

Measurement certification relating to the concentration of a substance in air, water or soil, frequency-weighted sound pressure level or frequency-weighted vibration acceleration level

Measurement Certification Business System - 3

● Certification not considered as measurement certification

- General - certification relating to loading and unloading of cargo onto or off a marine vessel
- Concentration - indoor air, drinking water, fertilizer, minerals, crude oil, wind velocity, temperature, transparency, electrical conductivity, chromaticity, offensive odor, asbestos concentration or coli group bacteria count

● Parties which are not required of registration as a measurement certification business

- National Government and local governments
- Some independent administrative institutions (National Institute of Advanced industrial Science and Technology, National Institute of Technology and Evaluation, National Institute of Industrial Health and National Institute for Environmental Studies)
- Measurement certification as specified under this law provided by organization registered under another law

Measurement Certification Business System - 4

● Measurement certification inspection

Of the specified measuring instruments used by measurement certifier for measurement certification business, the following must undergo measurement certification inspections conducted by a prefectual government or designated measurement certification inspection organization at specified intervals.

Non-automatic weighing instruments, balance weights, counterweights, Beckmann thermometers, leather area measuring machines, bomb calorimeters, noise meters, vibration level meters and concentration meters (excluding glass-electrode hydrogen ion concentration meters and sake purity measurement buoys)

A measurement certification inspection can be substituted for with a commissioned inspection conducted by a certified measurer or a self-inspection in the case of a proper measurement control business place which is a proper metrological control establishment.

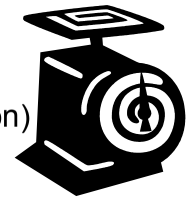
Certified measurers - 1

To ensure accurate measurement, proper metrological control is essential in the private sector, as well as verification, inspection, etc. by public organizations.

For this reason, the voluntary management of measuring instruments is being promoted by granting the qualification of a “certified measurer” to Persons who have the knowledge and experience sufficient to properly undertake measurement administration, including the inspection of measuring instruments.

● Classification of certified measurers

- General certified measurers
- Environmental certified measurers (concentration)
- Environmental certified measurers (noise and vibration)



Certified measurers - 2

● Main duties of certified measurers

- Commissioned inspection as substitute for periodic inspection (→ exemption from periodic inspection)
- Commissioned inspection as substitute for measurement certification inspection (→ exemption from measurement certification inspection)
- Measurement administration at measurement certification business (→ measurement certification business required to employ certified measurers)
- Measurement administration at proper measurement control business place

Certified measurers - 3

● Procedure to obtain qualification

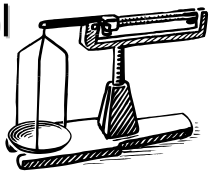
- Certified Measurer National Examination
  + Practical experience,ctc. → Registration
- Training given by National Institute of Advanced Industrial Science and Technology + Practica1 experience
  + Certification by Measurement Administration Counci1 (Juneand December) → Registration

10,000/year,15%

● Certified Measurer National Examination implementation schedule

September 1: Announcement of examination date via official gazette
→ October: Distribution of application forms by end of month)/acceptance of applications (starting on 15th)
→ First Sunday of March of following year: Examination
→End of May: Announcement of examination results

Proper measurement control business place -1



A business place which uses specified measurement instruments under proper measurement control may be designated as a proper measurement control business place on application.

The proper metrological control establishment system helps to advance voluntary metrological control operated by certified measurers.

- A business place operated under national government to submit the applications to the Ministry of Economy, Trade and Industry; and others file the application to respective prefectural governments.

Proper measurement control business place -2

Designated establishments have the following three advantages:

1) Exempted from periodic inspections for specified measuring instruments and allowed for self-inspections
2) Exempted from recertification after simple repairs on condition to compliance with standards
3) Entitled to display a sign declaring a “proper measurement control business place"

Proper measurement control business place -3

Main designation conditions

- Inspections are undertaken periodically by a certified measurer.
- The staff are given measurement management guidance by a certified measurer.
- Measurement management rules have been established.

Designated Body System - 1

In relation to instrument certification, etc, under the Measurement Law, a designated body system has been set up to facilitate the outsourcing of measurement tasks by public-interest corporations and private companies, as well as public organizations, according to the geographical area or type of measurement.
In view of administrative reform, deregulation and other circumstances, the system is designed to enable the private sector to enter the market wherever possible.

● Designated periodic inspection body
Designated periodic inspection bodies are organizations that conduct periodic inspections in place of prefectural governments and the governments of specified municipalities.
In a geographical area where periodic inspections have been outsourced to a designated periodic inspection body, the prefectural government or the government of a specified municipality does not conducts these inspections. [about60.End of January 2007]

Designated Body System - 2

● Designated verification body

A designated verification body is an organization that carries out verification in the same manner as the National Institute of Advanced Induslrial Science and Technology, a prefectural government, etc. Designated verification bodies are designated according to the type of measuring instrument, with their verification services provided alongside those of public organizations unlike periodic inspection services for which designation is made on an area basis for the purpose of delegating services to the private sector for the given area.

● Desjgnated measurement certification inspection body

A designated measurement certification inspection body is an organization that conducts measurement certification inspections in place of the prefectural government with which it is registered.
In an area where measurement certification inspections have been outsourced to a designated periodic inspection body, the prefectural government does not conduct these inspections, as in the case of a designated periodic inspection body [14.End of January 2007]

Understandings of principle, structure and influence factors

Measurement principle

Lever

Elasticity

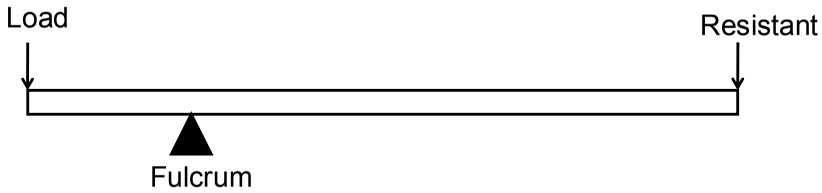
Spring

Load cell (electronically)

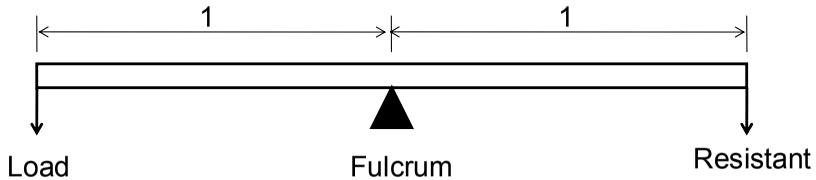
Levers in Mechanical Weighing Instruments

First order levers

The fulcrum is between the Load and Resistant. The resistant is usually either to the load or is less. In the case the lever has a mechanical advantage.

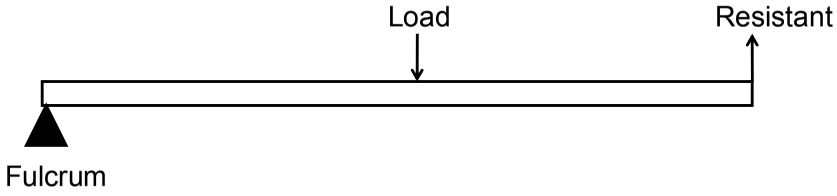


Simple beam (equal arm) Leverage 1 to 1



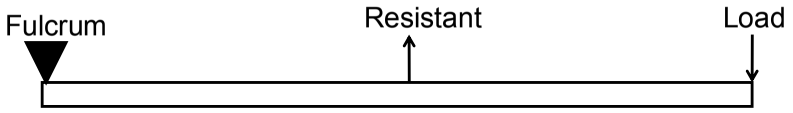
Second order levers

The fulcrum is at one end of the lever and the resistant is at the other. The lever has a mechanical advantage.

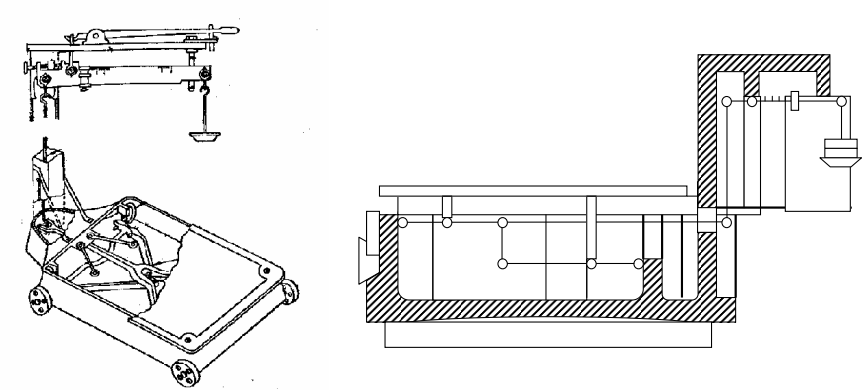


Third order levers

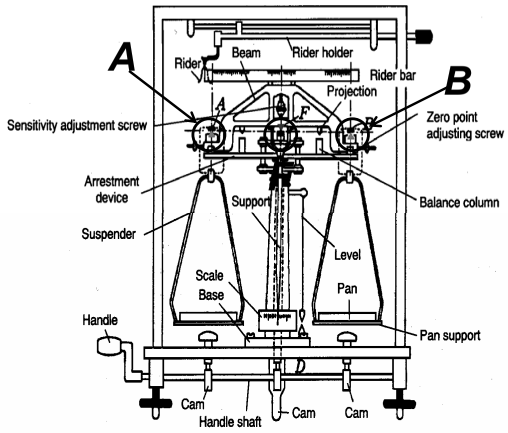
The fulcrum is at one end of the lever and the resistant is between the fulcrum and load. The lever has a mechanical advantage.

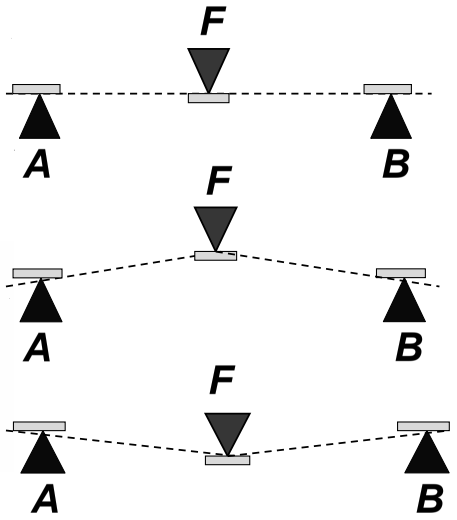


Combination of levers

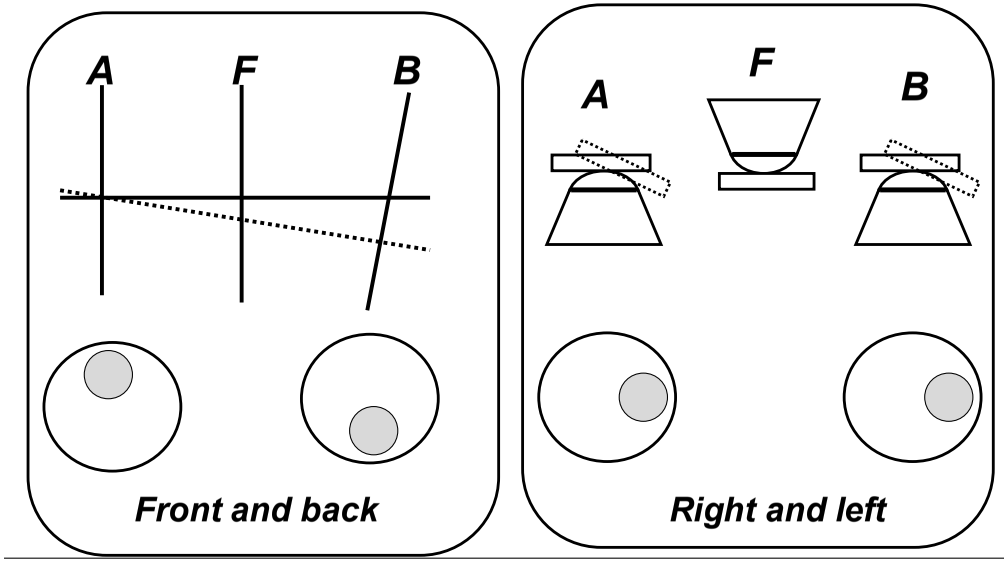


Equal arm balance - Sensitivity -



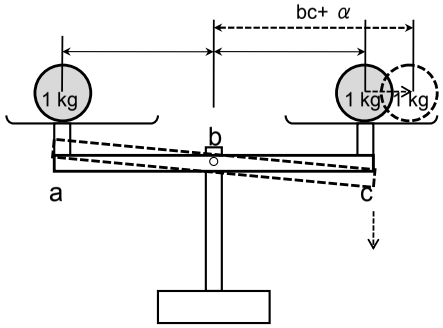


Equal arm balance -Eccentricity -

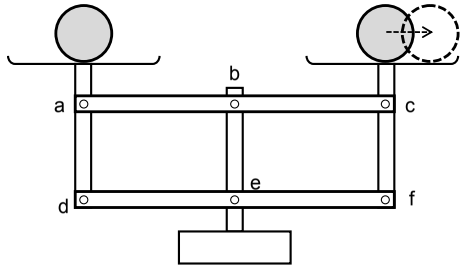


Roberval mechanism

Simple lever



Roberval mechanism



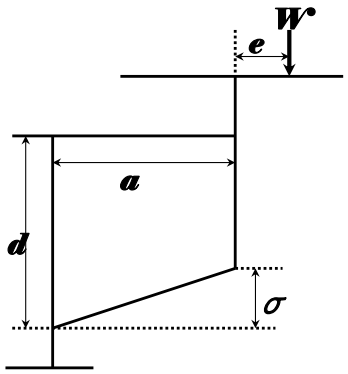
Same mass and same ratio of “ab” and “bc” ⇨ Balanced

Same mass and different ratio of “ab” and “bc” ⇨ Not balanced

This structure forms two parallelogram “abde” and “bcef” with six pivots which let the two beams (“abc” and “def”) move parallel at all times.

When a pair of the same mass is put on the two plates, the beam “ac” is always level no matter where the mass is placed on the plate only if the rectangular “acdf” form a parallelogram.

Robarval Eccentricity



Example:

$a = 60\,mm$

$d = 180\,mm$

$\sigma = 1\,mm$

$W = 2.5\,kg$

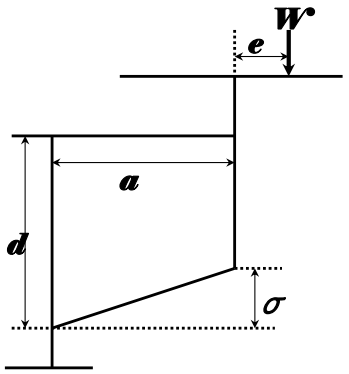
$e = 50\,mm$

$$E = \frac{We\sigma}{ad}$$

E = ?

AIST

Robarval Eccentricity



Answer :

$$E = \frac{2500 \times 500 \times 1}{60 \times 180} = 11.6\,g$$

$$E = \frac{We\sigma}{ad}$$

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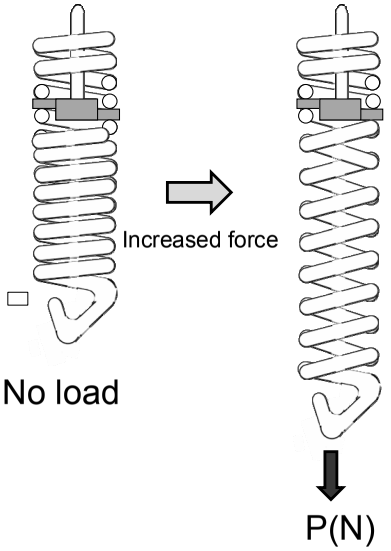
Spring



Hooke's law

Growth of the spring is in proportion to increased force

$$F = -kx$$

$$k = \frac{P}{\delta} = \frac{Gd^4}{8nd^3}$$

F : Restoring force exerted by the spring

k : Spring constant (N/mm)

x : The distance by which the spring is elongated

P : Load (N)

σ : Displacement (mm)

G : Rigidity of spring materials (N/mm²)

d : Diameter of spring (mm)

N : Reel number

D : Diameter of the coil

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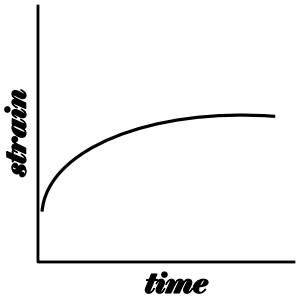
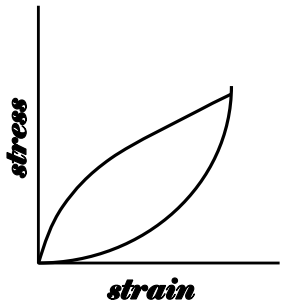
Spring -Creep and Hysteric's-

Creep



The strain by the outside power changes with the passage of time when the outside power is left while added.

Hystericis



The difference is caused in the relation between the stress and the strain in the increase and decrease of the stress.

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Spring -Temperature compensating-

The elastic coefficient changes with the temperature. The strain to constant outside power is different depending on the temperature.

Temperature compensating device

Bimetal

Compensated spring

Gravity compensation

All objects on the earth are subject to Earth's gravity all the time.
No measurements of force and mass can be free from the gravity effects, as the force and mass are measured by balancing the object's weight on a lever, or by converting it into modification of elastic body.
Gravity compensation is required because the gravity depends on the location on the earth (ex. latitude, longitude, altitude). 9.80665m/s^2 is used as the standard gravitational acceleration.
If a measuring instrument equipped with elastic bodies is calibrated at a place different from a place of use, the value of gravity compensation E_g is obtained in the following equation:

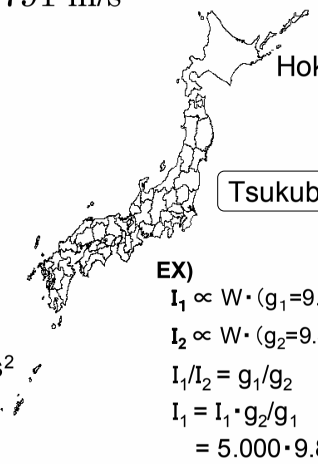
$$E_g = \frac{g_1 - g_2}{9.8} \cdot W$$

Where:
g1: gravitational acceleration at the calibration site
g2: gravitational acceleration at the place of use
W: mass, corresponding to inspection weight

Gravity compensation

A range of the gravity in Japan

9.806 m/s^2 ~ 9.791 m/s^2



Hokkaido:9.806 m/s^2 ・・・ (g_2)

Tsukuba 9.800 m/s^2 ・・・ (g_1)

Okinawa 9.791 m/s^2

EX)

$I_1 \propto W \cdot (g_1 = 9.800\ m/s^2)$

$I_2 \propto W \cdot (g_2 = 9.800\ m/s^2)$

$I_1/I_2 = g_1/g_2$

$I_1 = I_1 \cdot g_2/g_1$

$= 5.000 \cdot 9.806/9.800 = 5.003_1 = 5.003$ (kg)

Verification of Mechanical Weighing Scales

OIML R76 Edition 1992

Weighing instrument

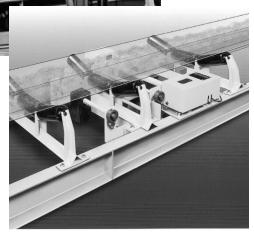
Measuring instrument that serves to determine the mass of a body by using the action of gravity on this body.

The instrument may also be used to determine other quantities, magnitudes, parameters or characteristic related to mass.

According to its method of operation, a weighing instrument is classified as an **automatic** or **non-automatic** instrument.

Automatic weighing instrument

An instrument that weighs without the intervention of an operator and follows a predetermined program of automatic processes characteristic of the instrument.



Non-automatic weighing instrument

Instrument that requires the intervention of an operator during the weighing process, for example to deposit on or remove from the receptor the load to be measured and also to obtain the result.

What's Mechanical Weighing Scale ?

Mechanical weighing scales use mechanical principle such as spring and lever when weighing is measured.

Various Mechanical Weighing Scale

Measurement principle

Lever

Elasticity

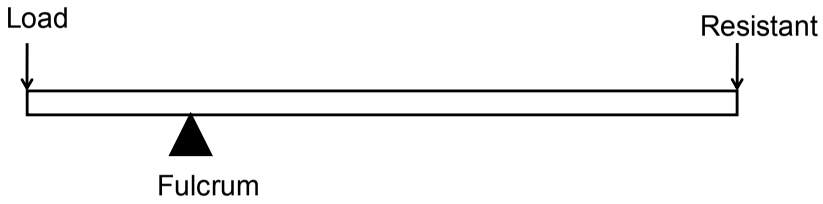
Spring

Load cell (electronically)

Levers in Mechanical Weighing Instruments

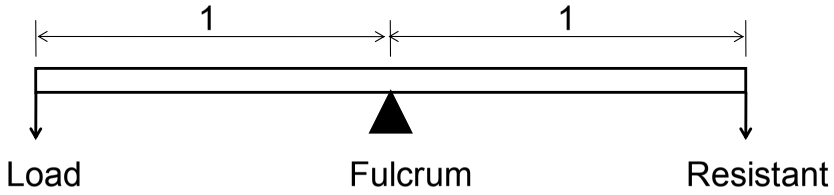
First order levers

The fulcrum is between the Load and Resistant. The resistant is usually either to the load or is less. In the case the lever has a mechanical advantage.



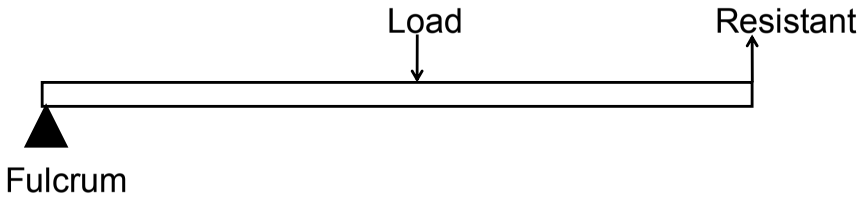
Example of First order levers

Simple beam (equal arm) Leverage 1 to 1



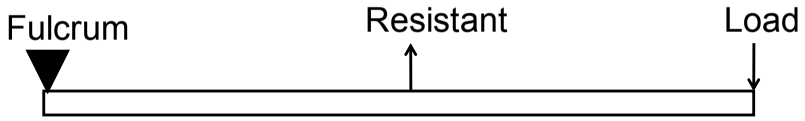
Second order levers

The fulcrum is at one end of the lever and the resistant is at the other. The lever has a mechanical advantage.

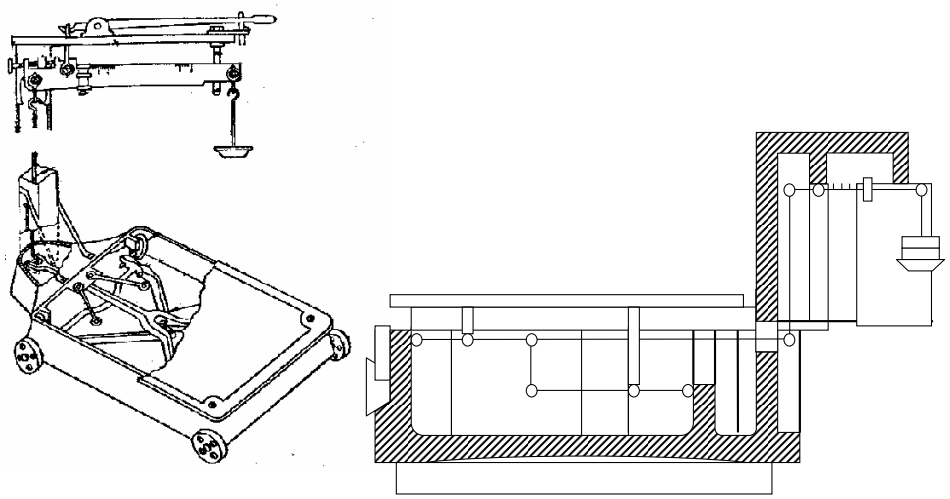


Third order levers

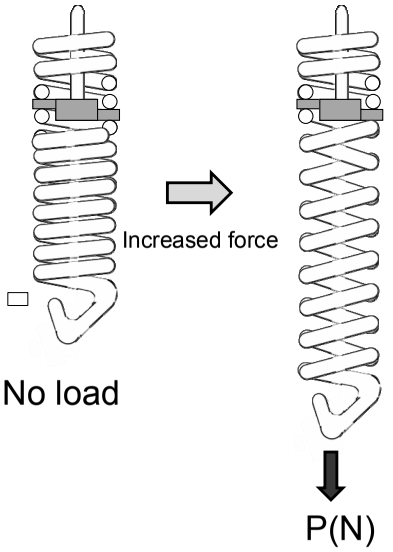
The fulcrum is at one end of the lever and the resistant is between the fulcrum and load. The lever has a mechanical advantage.



Combination of levers



Elasticity : Spring



Hooke's law

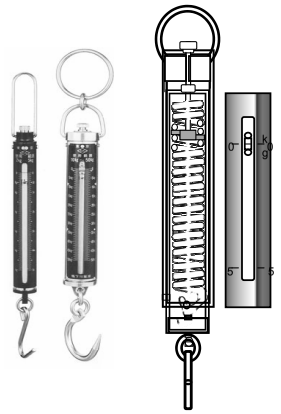
Growth of the spring is in proportion to increased force

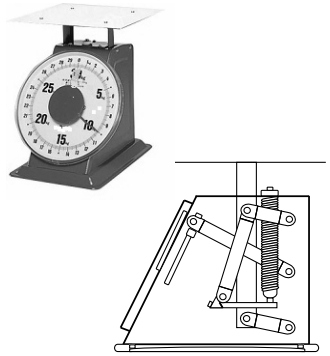
$$F = -kx$$

$$k = \frac{P}{\delta} = \frac{Gd^4}{8nd^3}$$

F : Restoring force exerted by the spring
k : Spring constant (N/mm)
x : The distance by which the spring is elongated
P : Load (N)
σ : Displacement (mm)
G : Rigidity of spring materials (N/mm^2)
d : Diameter of spring (mm)
N : Reel number
D : Diameter of the coil

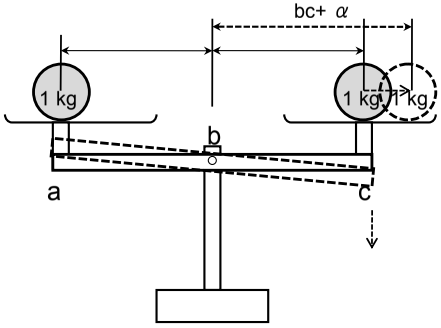
Spring type



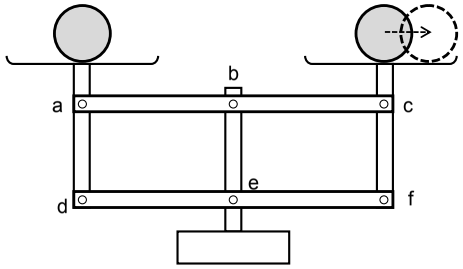


Roberval Mechanism

Simple Lever



Roberval Mechanism



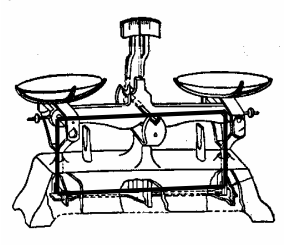
Same mass and same ratio of "ab" and "bc" ⇨ Balanced

Same mass and different ratio of "ab" and "bc" ⇨ Not balanced

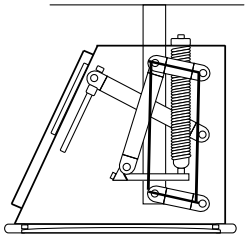
This structure forms two parallelogram "abde" and "bcef" with six pivots which let the two beams ("abc" and "def") move parallel at all times.

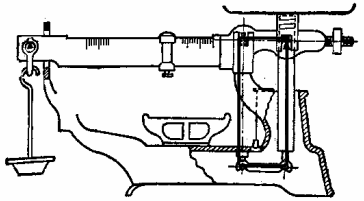
When a pair of the same mass is put on the two plates, the beam "ac" is always level no matter where the mass is placed on the plate only if the rectangular "acdf" form a parallelogram.

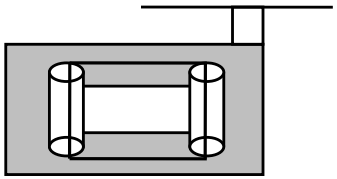
Examples of the Roberval mechanism used on scales



Roberval mechanism







OIML R76 Edition1992

Constitution of OIMLR76 1992

T. **Terminology**
1. Scope
2. Principles of the Recommendation
3. Metrological requirements
4. **Technical requirements for a self or semi self indication instruments**
5. Requirements for electronic instruments
6. **Technical requirements for a non self indication instruments**
7. Marking of an instruments
8. **Metrological controls**

Annex A Testing procedures for non automatic weighing instruments

Annex B Additional tests for electronic instruments

The related term of the mechanical weighing scale

T.1.2 Non automatic weighing instrument

Instrument that requires the intervention of an operator during the weighing process, for example to deposit on or remove from the receptor the load to be measured and also to obtain the result.

The instrument permits direct observation of the weighing results either displayed or printed; both possibilities are covered by the word “indication”.

Note: Terms such as “indicate”, “indicating component” and their derivatives do not include printing.

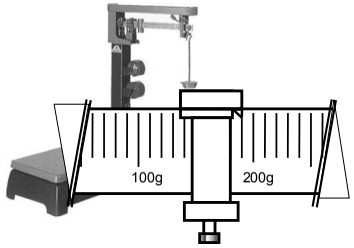
A non automatic weighing instrument may be:

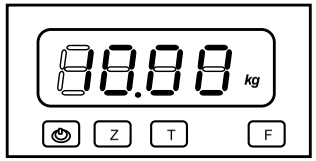
-graduated or non-graduated,

- self-indicating, semi-self indicating or non-self-indicating.

T.1.2.1 Graduated instrument

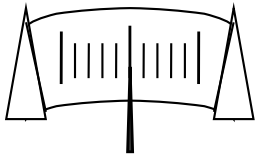
Instrument allowing the direct reading of the complete or partial weighing result.





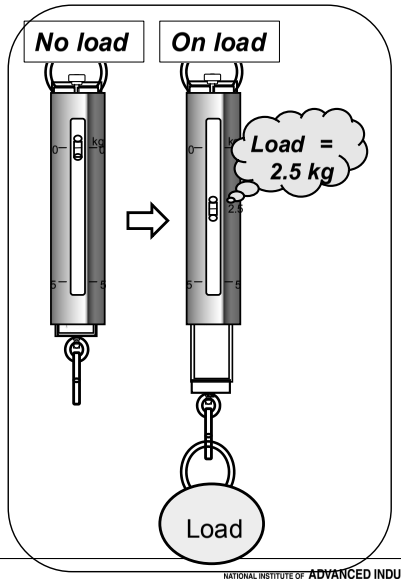
T.1.2.2 Non graduated instrument

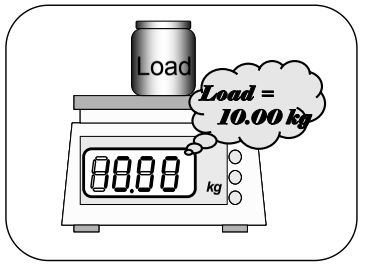
Instrument not fitted with a scale numbered in units of mass.

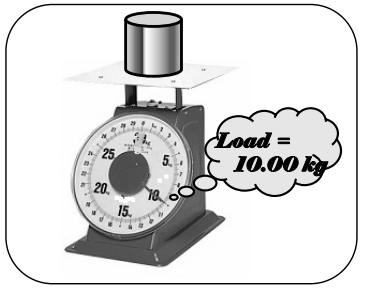


T.1.2.3 Self indicating instrument

Instrument in which the position of equilibrium is obtained without the intervention of an operator.



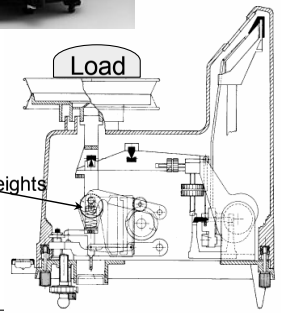




T.1.2.4 Semi self indicating instrument

Instrument in which a self indication weighing range, in which the operator intervenes to alter the limits of this range.

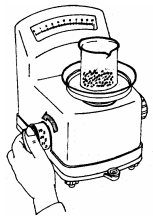
Example



Measurement procedure

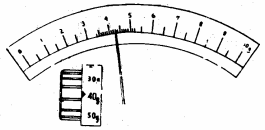
1. Load applies to load receptor

2. Remove inside weights by a knob



3. Repeat 2 till it is balanced in a weighing range

4. Load =
Remove value (knob)+ reading for indicator

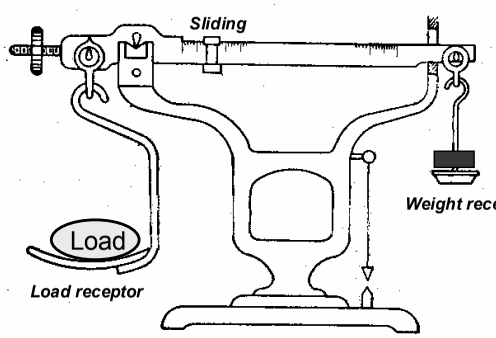


Knob = 40g
Indicator = 4.3g
Load = 44.3g

T.1.2.5 Non self indicating instrument

Instrument in which the position of equilibrium is obtained entirely by operator.

Example



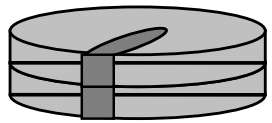
Measurement procedure

1. Load applies to load receptor

2. Weight applies to take the rough equilibrium.

3. Sliding moves to complete equilibrium

4. Load =
total weight value + reading of the sliding



T.2.1 Main device

T.2.1.1 Load receptor

Part of the instrument intended to receive the load.

T.2.1.2 Load-transmitting device

Pare of the instrument for transmitting the force produced by the load acting on the load receptor, to the load measuring device.

T.2.1.3 Load measuring device

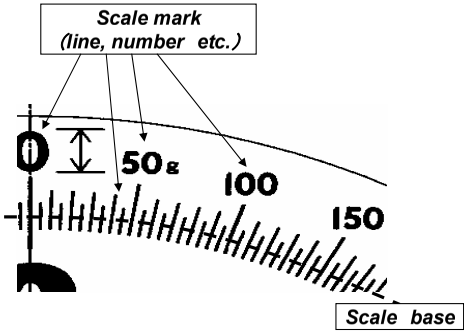
Part of the instrument for measuring the mass of the load by means of an equilibrium device for balancing the force coming from the load transmitting device, and an indicating or printing device.

T.2.4 Indicating device (of a weighing instrument)

Part of the load measuring device on which the direct reading of the result is obtained.

T.2.4.1 Indicating component

Component indicating the equilibrium and /or the result.
On an instrument with several positions of equilibrium it indicates only the equilibrium (so-call zero).
On an instrument with several positions of equilibrium it indicates both the equilibrium and the result. On an electronic instrument, this is the display.



T.2.4.2 Scale mark

A line or other mark on an indicating component corresponding to a specified value of mass.

T.2.4.3 Scale base

An imaginary line through the centers of all the shortest scale marks.

T.2.7.2 Zero setting device

Device for setting the indication to zero when there is no load on the load receptor.

T.2.7.2.1 Non automatic zero setting device

Device for setting the indication to zero by an operator.

T.2.7.4 Tare device

Device for setting the indication to zero when a load is on the load receptor:
Without altering the weighing range for net loads (additive tare device), or
Reducing the weighing range for net loads (subtractive tare device)

It may function as:
- A non automatic device (load balanced by an operator),
- A semi automatic device (load balanced automatically following a single manual command),
- An automatic device (load balanced automatically without the intervention of an operator).

T.3.2 Scale divisions

T.3.2.1 Scale spacing (instrument with analogue indication)

Distance between any two consecutive scale marks, measured along the scale base.

T.3.2.2 Actual scale interval (d)

Value expressed in units of mass of:

The difference between the values corresponding to two consecutive scale marks, for analogue indication, or

The difference between two consecutive indication values, for digital indication.

T.3.2.3 Verification scale interval (e)

Value, expressed in units of mass, used for the classification and verification of an instrument.

T.3.2.4 Scale interval of numbering

Value of the difference between two consecutive numbered scale marks.

T.3.2.5 Number of verification scale intervals (single-interval instrument)

Quotient of the maximum capacity and the verification scale interval:

$$n = Max / e$$

T.4 Metrological properties of an instrument

T.4.1 Sensitivity

For given value of the measured mass, the quotient of the change of the observed variable I and the corresponding change of the measured M

$$k = \Delta I / \Delta M$$

Metrological Requirements

Accuracy Classes for NAWI's

1. Class 1: Special accuracy
   ultramicro-, micro-, semimicro-, macro-

2. Class 2: High accuracy
   precision balances,

3. Class 3: Medium accuracy
   NAWI's for trade use

4. Class 4: Ordinary accuracy
   NAWI's for lower accuracy

Accuracy classes for NAWI's

Accuracy class	Verification scale interval	Number of verification scale interval		Minimum capacity
		Minimum	Maximum	
I	0.001g≦e	50 000	-	100 e
II	0.001 g≦ e ≦0.05 g	100	100 000	20 e
	0.1g≦e	5 000	100 000	50 e
III	0.1 g≦ e ≦2 g	100	10 000	20 e
	5 g≦ e	500	10 000	20 e
IIII	5 g≦ e	100	1 000	10 e

Maximum permissible error

MPE for verification

Maximum permissible errors on initial verification	for load m expressed in verification scale interval e			
	I	II	III	IIII
±0.5 e	0 ≦ m ≦ 50 000	0 ≦ m ≦ 5 000	0 ≦ m ≦ 500	0 ≦ m ≦ 50
±1.0 e	50 000 < m ≦ 200 000	5 000 < m ≦ 20 000	500 < m ≦ 2 000	50 < m ≦ 200
±1.5 e	200 000 ≦ m	20 000 < m<100 000	2 000 < m<10 000	200 < m<1 000

MPE for in-service inspection

Maximum permissible errors on in-service	for load m expressed in verification scale interval e			
	I	II	III	IIII
±1.0 e	0 ≦ m ≦ 50 000	0 ≦ m ≦ 5 000	0 ≦ m ≦ 500	0 ≦ m ≦ 50
±2.0 e	50 000 < m ≦ 200 000	5 000 < m ≦ 20 000	500 < m ≦ 2 000	50 < m ≦ 200
±3.0 e	200 000 ≦ m	20 000 < m<100 000	2 000 < m<10 000	200 < m<1 000

Calculation of Maximum Permissible Error

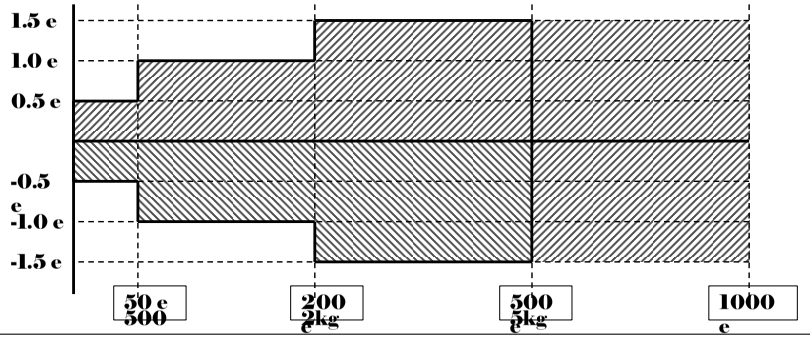
Max : 5 kg,
Verification scale interval (e): 10 g,
n : 500,
Class : 4

⇒ ***MPE ?***

Calculation of Maximum Permissible Error

Max : 5 kg, Verification scale Interval (e): 10 g, n : 500, Class : 4

MPE	e	e	gram
± 0.5 e	0 ≦ n ≦??	0 ≦ n ≦50e	0 ≦ n ≦500g
± 1 e	??< n ≦???	50e< n ≦200e	500g< n ≦2kg
± 1.5 e	???< n ≦ ????	200e< n ≦ 1000e	2kg< n ≦ 10kg



Calculation of Maximum Permissible Error

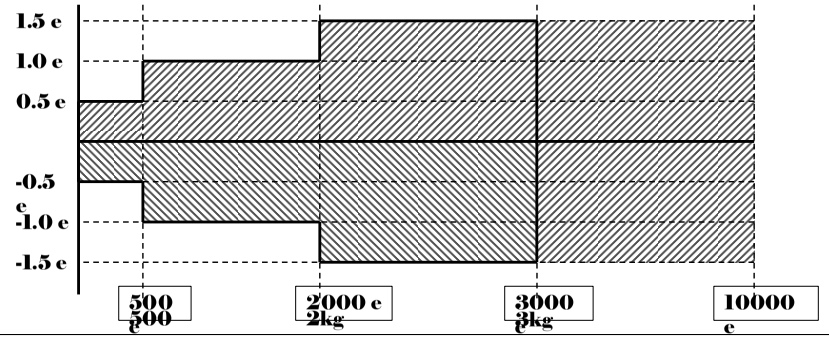
Max : 3 kg,
e : 1 g,
n : 3000,
Class : 3

⇒ ***MPE ?***

Calculation of Maximum Permissible Error

Max : 3 kg, e : 1 g, n : 3000, Class : 3

MPE	e	e	gram
± 0.5 e	0 ≦ n ≦???	0 ≦ n ≦500e	0 ≦ n ≦500g
± 1 e	???< n ≦????	500e< n ≦2000e	500g< n ≦2kg
± 1.5 e	????< n ≦ ?????	2000e< n ≦ 10000e	2kg< n ≦ 10kg



Verification Standards (3.7)

Weights 3.7.1

The standard weights or standard masses used for the verification of an instrument shall not have an error greater than 1/3 of the maximum permissible error of the instrument for the applied.

Max : 3 kg, Verification scale interval (e) : 1 g, Min : 20 g, Class 3

Test points	Test load	MPE (e)	MPE(g)	MPE/3	Weights
Zero	0	0.5 e	0.5 g	0.17 g	-
Min	20 g	0.5 e	0.5 g	0.17 g	***M2 (3mg)***
500 e	500 g	0.5 e	0.5 g	0.17 g	***M2 (75mg)***
Any	1000 g	1 e	1.0 g	0.33 g	***M2 (150mg)***
2000 e	2000 g	1 e	1.0 g	0.33 g	***M2 (300mg)***
Max	3000 g	1.5 e	1.5 g	0.5 g	***M2 (450mg)***

OIML R 111 Weights of classes E1, E2, F1, F2, M1, M1–2, M2, M2–3 and M3

Minimum accuracy class of weights

The accuracy class for weights used as standards for the verification of weights or weighing instruments should be
in accordance with the requirements of the relevant OIML Recommendations.

The OIML weight classes are defined as follows:

Class E1: Weights intended to ensure traceability between national mass standards (with values derived from the International Prototype of the kilogram) and weights of class E2 and lower. Class E1 weights or weight sets shall be accompanied by a calibration certificate (see 15.2.2.1).

Class E2: Weights intended for use in the verification or calibration of class F1 weights and for use with weighing instruments of special accuracy class I. Class E2 weights or weight sets shall be accompanied by a calibration certificate (see 15.2.2.2). They may be used as class E1 weights if they comply with the requirements for surface roughness, magnetic susceptibility and magnetization for class E1 weights, and if their calibration certificate gives the appropriate data as specified in 15.2.2.1.

Class F1: Weights intended for use in the verification or calibration of class F2 weights and for use with weighing instruments of special accuracy class I and high accuracy class II.

Class F2: Weights intended for use in the verification or calibration of class M1 and possibly class M2 weights. Also intended for use in important commercial transactions (e.g. precious metals and stones) on weighing instruments of high accuracy class II.

Class M1: Weights intended for use in the verification or calibration of class M2 weights, and for use with weighing instruments of medium accuracy class III.

Class M2: Weights intended for use in the verification or calibration of class M3 weights and for use in general commercial transactions and with weighing instruments of medium accuracy class III.

Class M3: Weights intended for use with weighing instruments of medium accuracy class III and ordinary accuracy class IIII.

Classes M1–2 and M2–3 : Weights from 50 kg to 5 000 kg of lower accuracy intended for use with weighing instruments of medium accuracy class III.

Note: The error in a weight used for the verification of a weighing instrument shall not exceed 1/3 of the maximum permissible error for an instrument. These values are listed in section 3.7.1 of OIML R 76 *Non-automatic Weighing Instruments (1992).*

Metrological Requirements

Maximum permissible error

Values of maximum permissible error on initial verification
Values of maximum permissible error in service

Maximum permissible errors for net value

Repeatability

Eccentric load

Discrimination

Tilting

Static temperature

Temperature effect on no load indication

Power supply

Zero return

Creep

Technical requirements for a self or semi-self indication instruments

【Excerpt concerning mechanical weighing scales】

Security

Indication of weighing results

Analogue indication device

Zero setting device

Tare device

Locking position

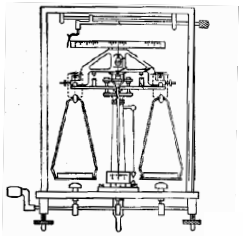
Technical requirements for a non self indication instruments

Mechanical weighing scale in OIML R 76

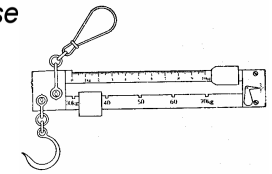
Non self indication instrument

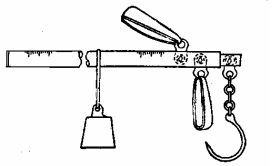
Simple instruments

Simple equal arm and 1/10 ratio beams

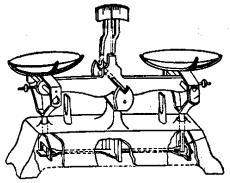


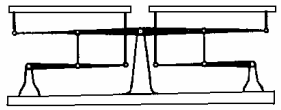
Simple steelyards with sliding poise



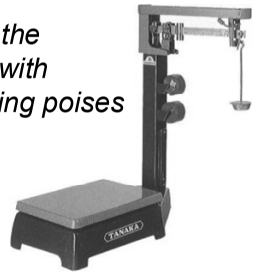


Roberval and Beranger instruments





Instruments of the steelyard type with accessible sliding poises



Instruments with ratio platforms

- ***Minimum sensitivity***
- ***Acceptable solutions for indicating device***
- ***Conditions of construction***

Metrological Controls

Verification procedure

Verification Items

1. Values of maximum permissible error on initial verification
2. Maximum permissible error for net values
3. Discrimination
4. Repeatability
5. Tare weighing device
6. Eccentricity
7. Accuracy of zero setting device
8. Accuracy of tare device

※ ***Visual inspection***

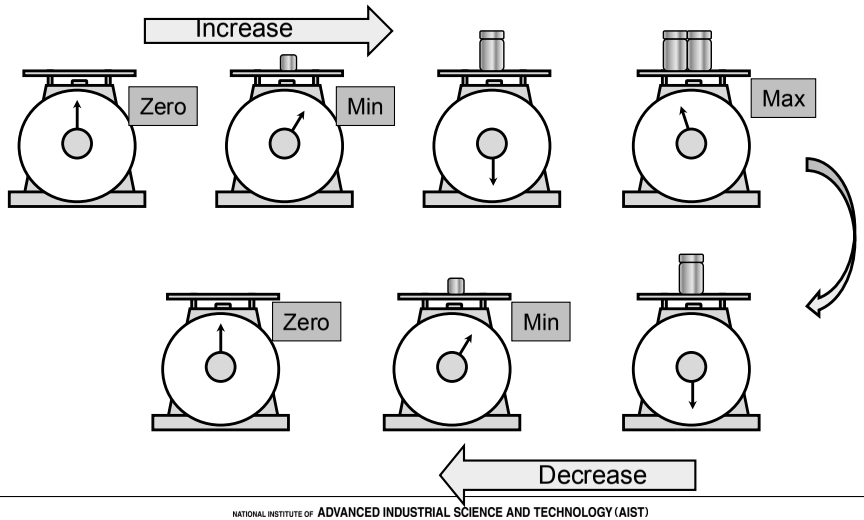
1) metrological characteristic

2) prescribed inscription and position for verification and control marks

Weighing Performance Test

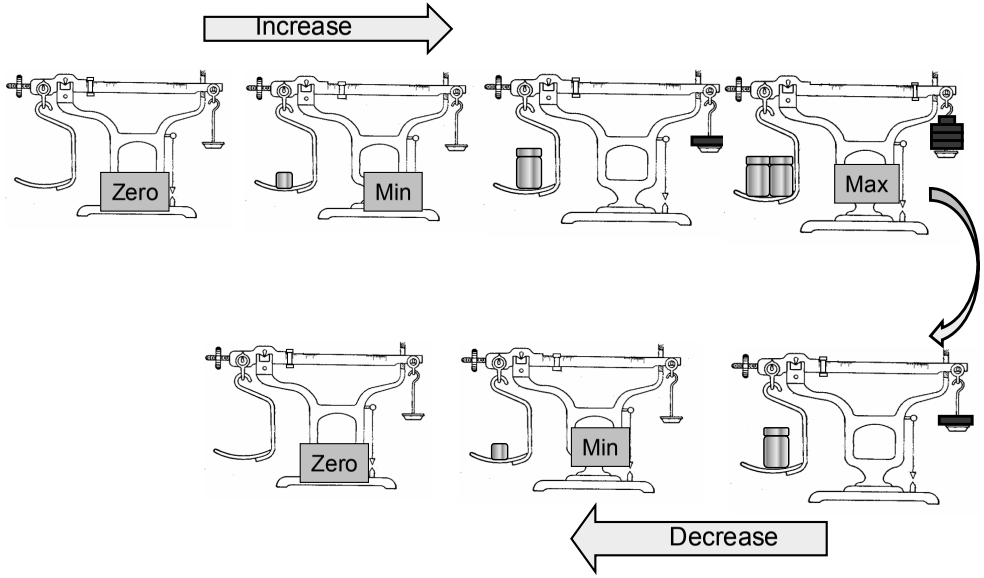
Apply test loads from zero up to and including Max, and similarly remove the test loads back to zero.

Self indication instruments



Non self indication instruments

Platform instrument



Determining the verification for weighing tests at least 5 shall be selected. The test loads selected shall include Max, and Min, and values at or near those at which the MPE changes.

Example : ***Max : 2 kg, e : 5 g, Min : 50 g, class 4***

Determining the test loads and MPE

Test load : Zero,
1 Min,
2 ??(MPE changes 1),
3 ??(MPE changes 2),
4 ??(any load),
5 Max

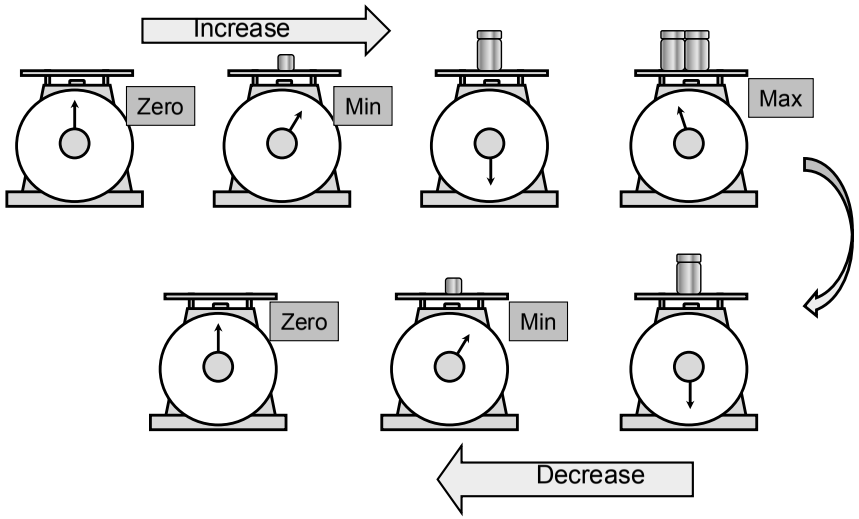
Test load : 0 g,
1 50 g,
2 250 g (MPE changes 1),
3 1000 g (MPE changes 2),
4 1500 g (Any load),
5 2000 g

Test load : 0 g,
1 50 g,
2 250 g
3 1000 g
4 1500 g
5 2000 g

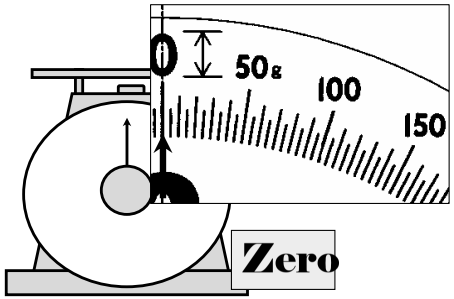
MPE ?

Test load : 0 g : 2.5 g
1 50 g : 2.5 g
2 250 g : 2.5 g
3 1000 g : 5 g
4 1500 g : 7.5 g
5 2000 g : 7.5 g

Load	Indication		Add. load		Error		Corrected error		MPE
0									2.5
50									2.5
250									2.5
1000									5
1500									7.5
2000									7.5

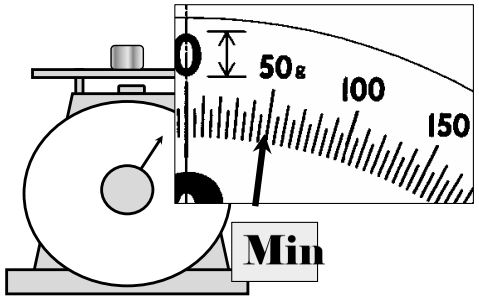


Weighing Performance Test



I = 0.0 g

L = 0 g



I = 49.5 g

L = 50 g

Load	Indication		Add. load		Error		Corrected error		MPE
0	0.0	0.0							2.5
50	49.5	49.5							2.5
250	249.5	249.5							2.5
1000	999.5	999.5							5
1500	1499.5	1499.5							7.5
2000	1999.0								7.5

Error Formula

$$E = I - L$$

I = Indication L = Load

$E_c = E - E_0$

Load	Indication		Add. load		Error		Corrected error		MPE
0	0.0	0.0			0	0	0	0	2.5
50	49.5	49.5			-0.5	-0.5	-0.5	-0.5	2.5
250	249.5	249.5			-0.5	-0.5	-0.5	-0.5	2.5
1000	999.5	999.5			-0.5	-0.5	-0.5	-0.5	5
1500	1499.5	1499.5			-0.5	-0.5	-0.5	-0.5	7.5
2000	1999.0				-1.0		-1.0		7.5

Passed or Failed ?

Load	Indication		Add.load		Error		Corrected error		MPE
0	1.0	1.5							2.5
50	49.0	49.0							2.5
250	248.0	249.0							2.5
1000	998.0	999.0							5
1500	1498.0	1498.0							7.5
2000	1997.5								7.5

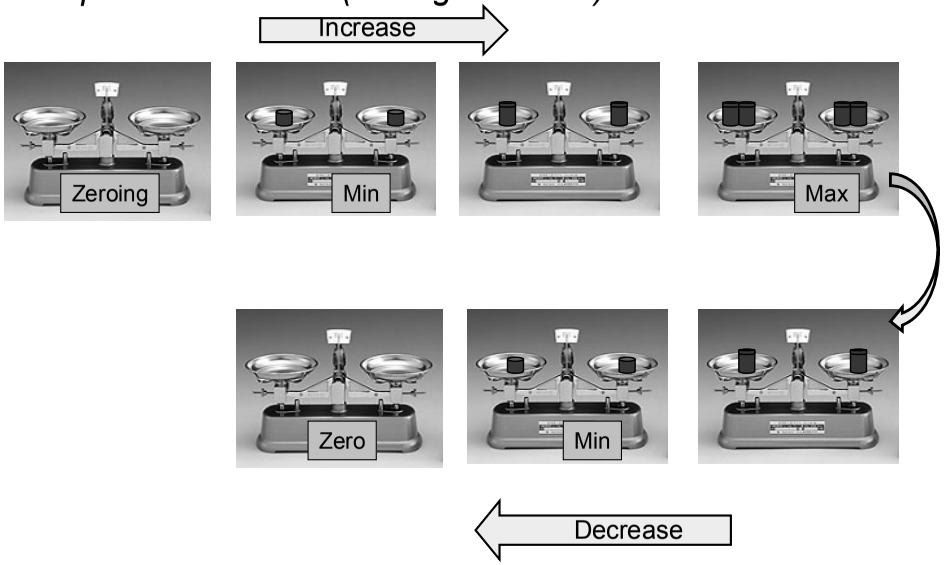
Passed or Failed ?

Load	Indication		Add.load		Error		Corrected error		MPE
0	1.0	1.5			1.0	1.5	0	0.5	2.5
50	49.0	49.0			-1.0	-1.0	-2.0	-2.0	2.5
250	248.0	249.0			-2.0	-1.0	-3.0	-2.0	2.5
1000	998.0	999.0			-2.0	-1.0	-3.0	-2.0	5
1500	1498.0	1498.0			-2.0	-2.0	-3.0	-3.0	7.5
2000	1997.5				-2.5		-3.5		7.5

Passed or Failed ?

Non self indication instruments

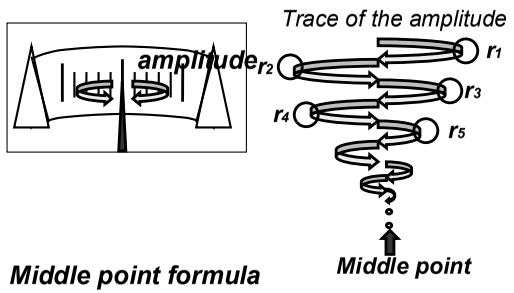
Equal arm balance (Non graduation)



Calculations

Error formula

$$E = \frac{\Delta}{2} \times \frac{n_1 + n_2 - 2n_0}{|n_2 - n_\Delta|}$$



Δ = e

n_0: Middle point of zero

n_1: Middle point of on loads

n_2: Middle point when changed the load of right and left

n_Δ : Middle point when burdened Δ after the measurement of n_2

Middle point formula

$$\frac{1}{2} \times \left(\frac{r_1 + r_3 + r_5}{3} + \frac{r_2 + r_4}{2} \right)$$

Example : ***Max : 200 g, e : 0.2 g, Min : 4 g, class 3***

Determining the test loads and MPE

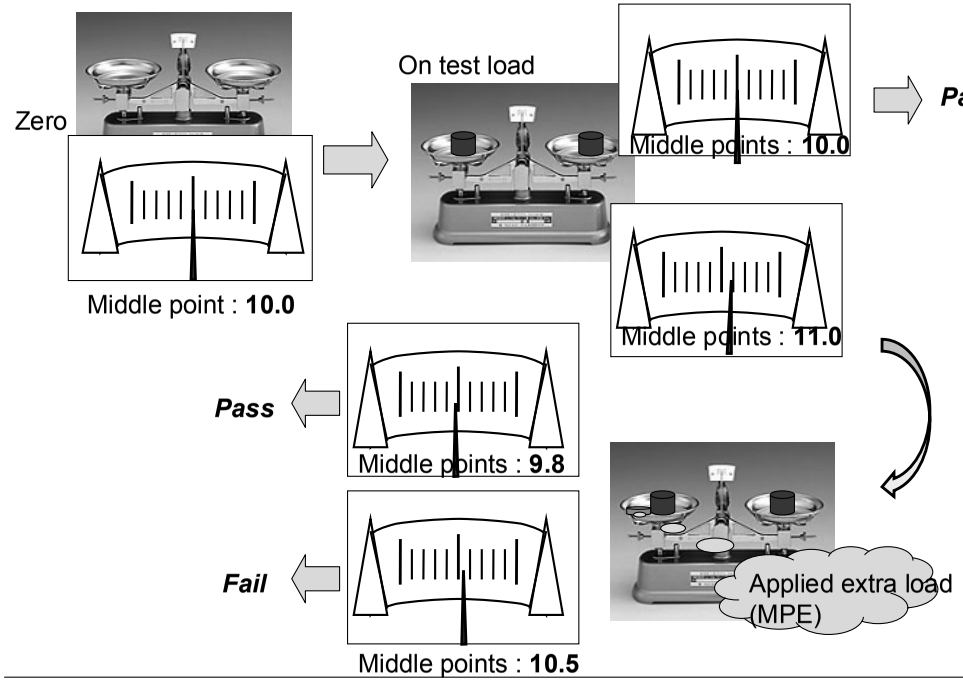
Test load : Zero,
1 Min,
2 ??(MPE changes 1),
3 ??(MPE changes 2),
4 ??(any load),
5 Max

Test load : 0 g,
1 4 g,
2 100 g (MPE changes 1),
3 --- g (MPE changes 2),
4 --- g ,
5 200 g

Test load : 0 g,
1 4 g,
2 50 g
3 100 g
4 150 g
5 200 g

How much MPE ?

Test load : 0 g, 0.1 g
1 4 g, 0.1 g
2 50 g 0.1 g
3 100 g 0.2 g
4 150 g 0.2 g
5 200 g 0.2 g

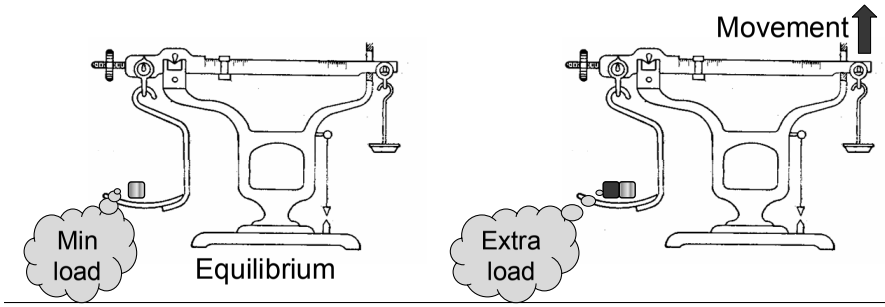


Discrimination Test

Non self indicating instrument

An extra load equivalent to 0.4 times the absolute values of the maximum permissible error for the applied load when gently placed on or withdrawn from the instrument at equilibrium shall produce a visible movement of the indicating element.

This test shall be performed with three different loads. Min, 1/2Max, Max

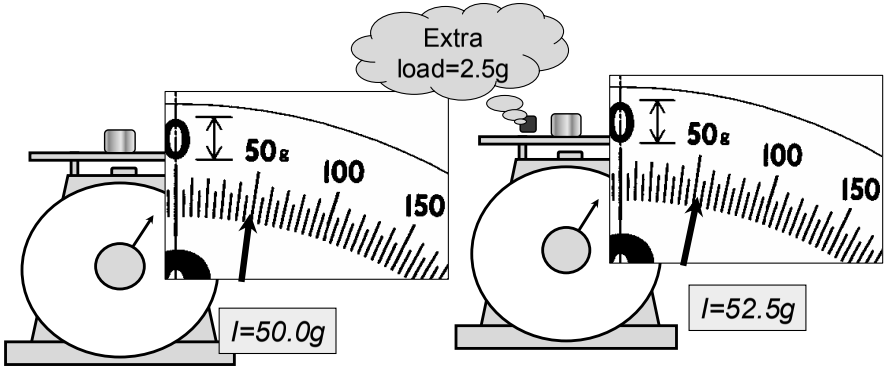


Self or semi self indicating instrument

Analogue Indication

An extra load equivalent to the absolute value of the maximum permissible error for the applied load when gently placed on or withdrawn from the instrument at equilibrium shall cause a permanent displacement of the indicating element corresponding to not less than 0.7 times extra load.

This test shall be performed with three different loads. Min, 1/2Max, Max



Analogue indication

Load	Indication I1	Extra load = MPE	Indication I2	I2-I1
50	50	2.5	52.5	2.5
1000	1000	5	1002.5	2.5
2000	2000	7.5	2005.0	5.0

Check if I2-I1 ≧0.7 MPE

Passed or Failed ?

Non self indicating instruments

Load	Indication	Extra load = 0.4 MPE	Movement

Mark visible movement by "+"

Passed or Failed ?

Sensitivity

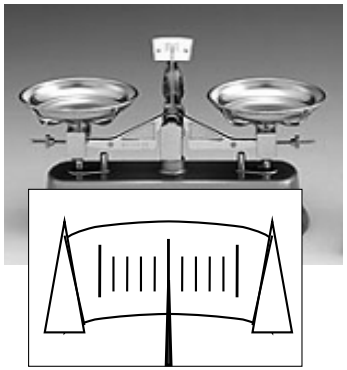
Only applied on non self indicating instrument

An extra load equivalent to the absolute value of the MPE for the applied load, shall be placed on the instrument at equilibrium and shall cause a permanent displacement of the indicating element of at least:

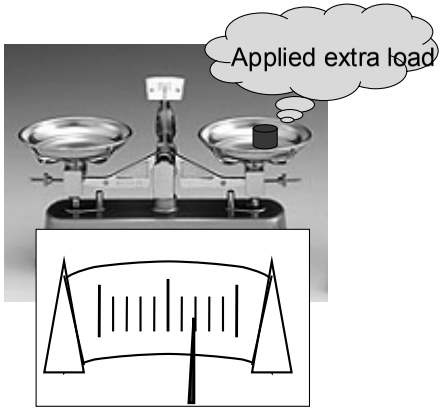
- 1 mm for an instrument of class 1 or 2;
- 2 mm for an instrument of class 3 or 4 with Max ≤30 kg;
- 5mm for an instrument of class 3 or 4 with Max >30 kg.

The test shall be performed with a minimum of two difference loads (e.g. zero and Max)

Test load : zero



Apply extra load



Middle points of reading

Reading 1 : 10.0

Middle points of reading

Reading 2 : 12.0

Linear distance between reading 1 and reading 2

Repeatability

The difference between the results several weighings of the same load shall not be greater than the absolute value of the maximum permissible error of the instruments

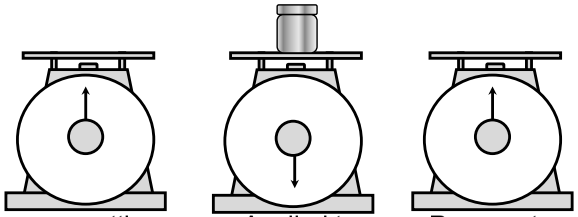
Two series of weighings shall be performed ,one with a load of about 50% and one with a load close to 100% of Max.
Normally no more than 3 weighings on class 3 and 4 or 6 weighings on classes 1 and 2 are necessary.

Repeatability Test

Analogue indication

Example : ***Max : 2 kg, e : 5 g, Min : 50 g, class 4***

Test load :
1 kg MPE : 5 g
2kg MPE : 7.5 g



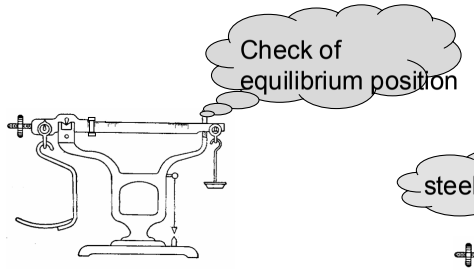
zero setting and check | Applied to test load | Remove to test load

No	Load	Indication	Load	Indication
1	1000	995.0	2000	1999.0
2	1000	999.5	2000	1995.0
3	1000	1000.5	2000	2000.0
	Max-Min	***5.5***	Max-Min	***5.0***

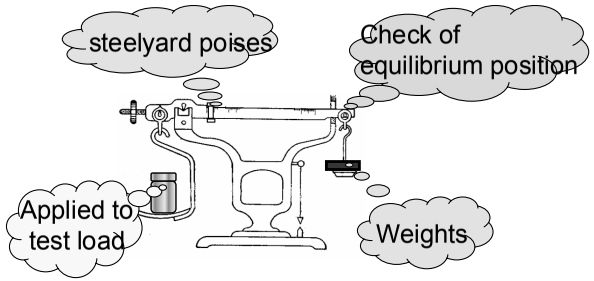
Passed or Failed ?

Non self indicating instrument

For platform instrument



zero setting and check



Bring the indicating element to the equilibrium position using the proportional weights and/or steelyard poises and note the indication.

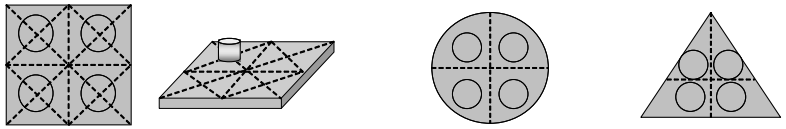
Eccentricity

Requirement 3.6.2

The Indications for different positions of a load shall meet the maximum permissible errors, when the is tested according to following.

- Instrument with a load receptor having ***n*** points of support, with ***n* ≦ 4**

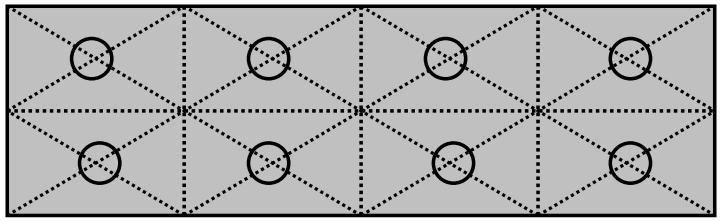
Test load : (Max + Additive tare effect) /3



○ **Load positions**

- Instrument with a load receptor having ***n*** points of support, with ***n* > 4**

Test load : (Max + Additive tare effect)/(n-1)



○ **Load positions**

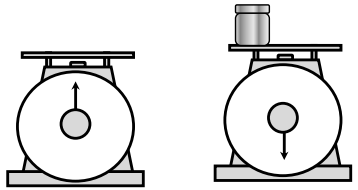
Eccentricity

Analogue indication

Example : Max : 30kg, e : 100 g, Min :1 kg, Class 4

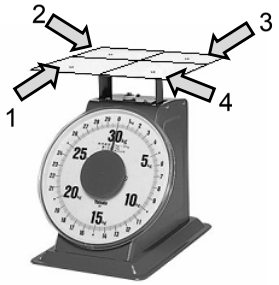
n points of support, with ***n* ≦ 4**

Test load : 10 kg



zero setting and check

Test load applied to No.1

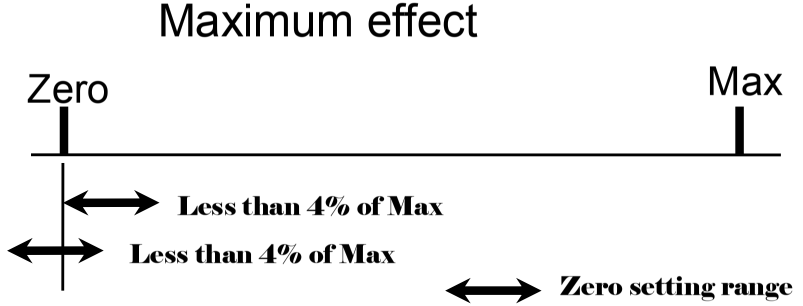


Passed or Failed ?

Location	L	I	E	Ec	MPE
1	0	10	+10		
1	10000	9990	-10	-20	100
2	0	0	0		
2	10000	9900	-100	-100	100
3	0	10	+10		
3	10000	10010	+10	0	100
4	0	0	0		
4	10000	9950	-50	-50	100

Zero-Setting Requirements

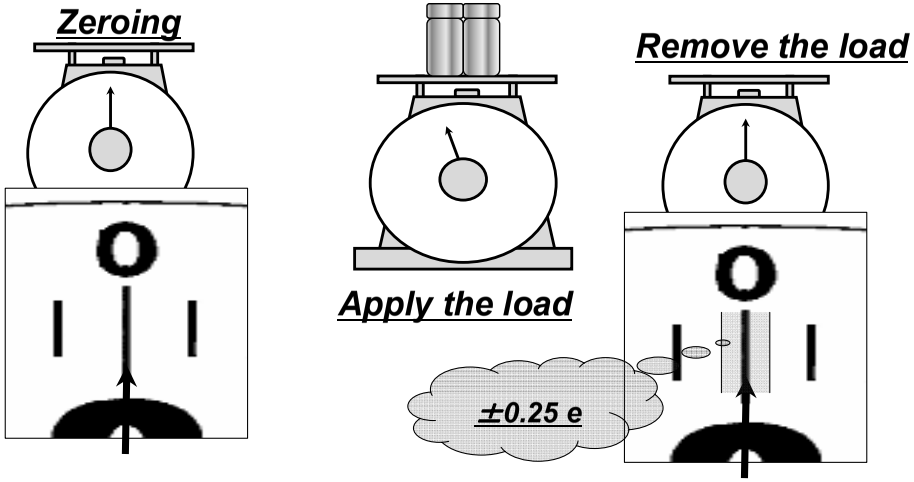
- The effect does not alter Max
- The accuracy is 0.25 e or 0.5 d on a auxiliary indicating device
- The range is 4 % of Max for zero-setting



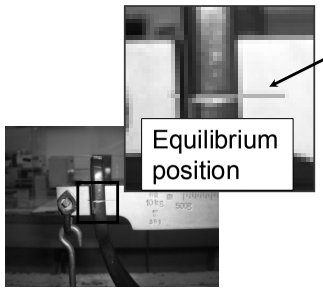
Zero setting accuracy

After zero setting the effect of zero deviation on the result of the weighing shall not be more than 0.25e; however, on an instrument with auxiliary indicating devices this effect shall be not more than 0.5d

Analogue indication



Non self indicating instrument



Zeroing

Apply the load

Check the equilibrium position after removing the load

If it does not return to its equilibrium position,
- 0.25e on the appropriate load receptor or,
- 0.25e moves poise.

Indicator has moved through the equilibrium point of the instrument — ***Pass***

Indicator has not moved through the equilibrium point the instrument — ***Fail***

Tare Device

Device for setting the indication to zero when a load is on the load receptor without altering the weighing range for net loads (additive tare device), or reducing the weighing range for net loads (subtractive tare device).

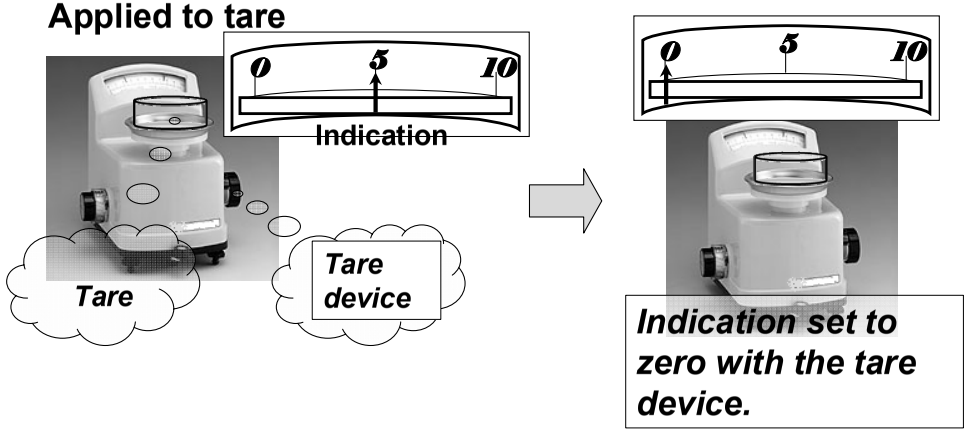
It may function as:
- a non-automatic device (load balanced by an operator),
- a semi-automatic device (load balanced automatically following a single manual command),
- an automatic device (load balanced automatically without the intervention of an operator).

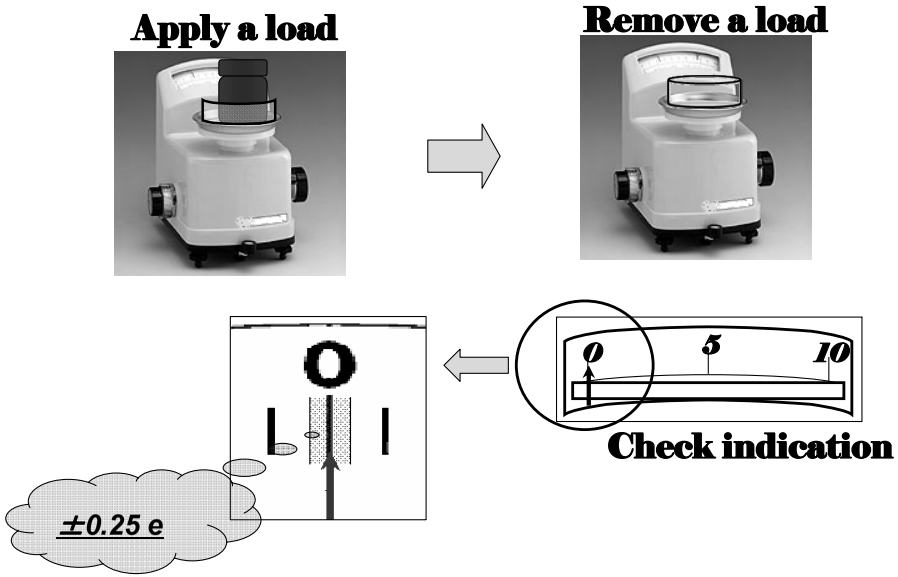
Tare Setting Accuracy

- A tare device shall permit setting the indication to zero with an accuracy better than:
- ±0.25e for electronic instruments and any instrument with analogue indication

Semi-self indicating instrument

Applied to tare





Metrological Controls in Japan

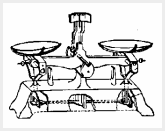
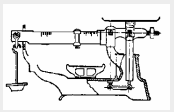
For non-automatic weighing instruments

Information

Metrological Controls in Japan

Non-automatic weighing instruments

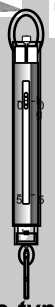
Mechanical type

No type approval required

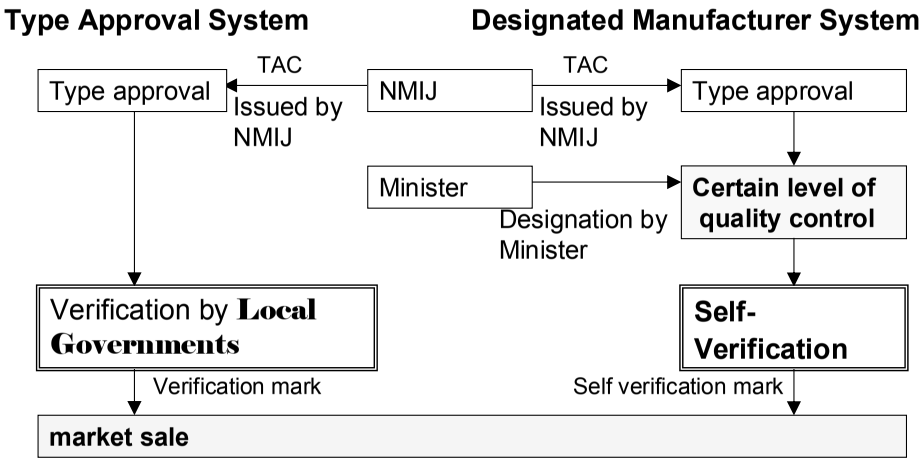
Electrical and spring type




Subject to type approval

Metrological controls in Japan



Metrological controls in Japan

Initial Verification (Local Governments)

Re-verification
Local Governments (47)

- Taxi meters (1 year)
- Water meter(8 years)
- Hot water meters(8 years)
- Fuel-dispenser (7 years)
- Heatmeters(8 years)
- Illuminometers (2 years)
- Sound level meters (5 years)

, etc.

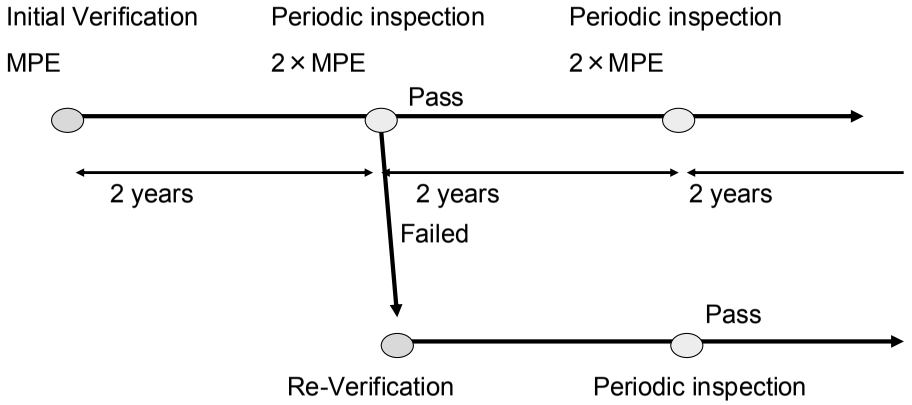
Periodic inspection
Local Governments (47)
& Special Cities (119)

- ***Weighting instrument (Once in two years)***
- Leather-area measuring machines (once a year)

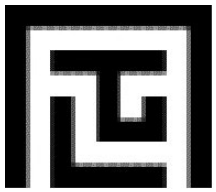
Initial only

- Hydrometers
- Glass clinical thermometer
- Aneroid sphygmomano meters

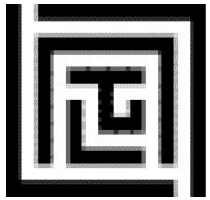
Non-automatic weighting instruments



Legal controls marks in Japan



Verification mark



Self-Verification mark

Periodic inspection mark

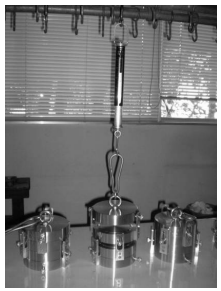
Number of verification and periodic inspection in Tokyo

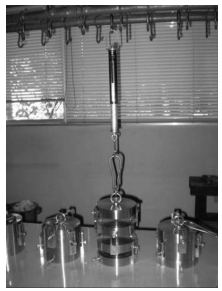
2005.04 – 2006.03

		Verification	In-service
Electronic		**225**	**8660**
Mechanical	(Spring)	**10,711**	**11,410**
	(Other)	**167**	**2703**
Total		**11,317**	**22,773**

Verification equipment for hanging scale in Tokyo

Verification on 500 hanging scales is applied for a day when the demand is high.





Country Report
of
the Kingdom of Cambodia

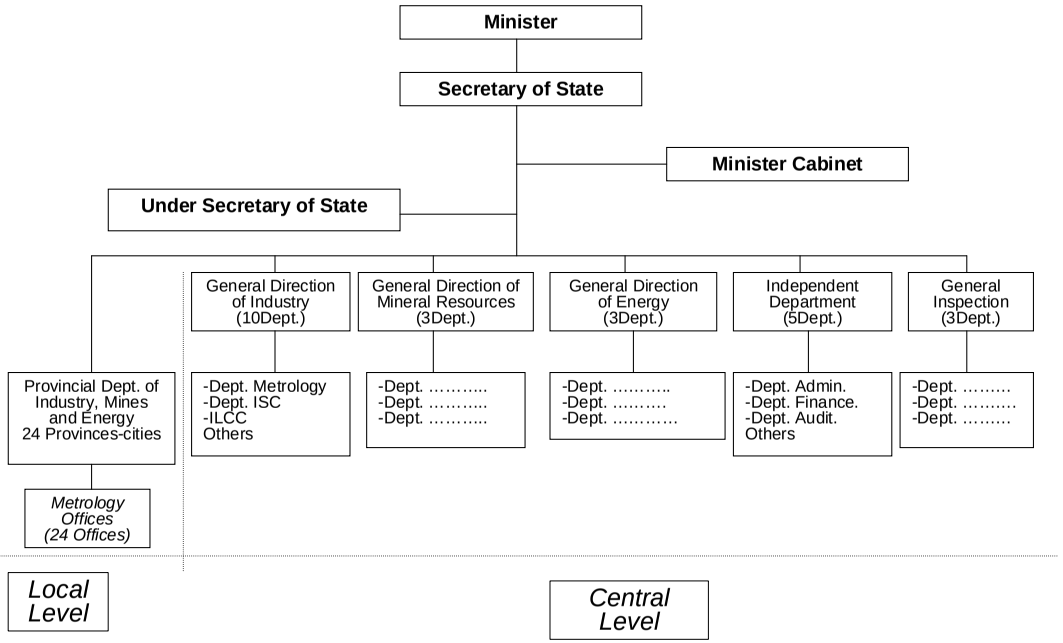
Training Course
on
Verification on Mechanical Weighing Scales
from 25-28 September 2007
In Ho Chi Minh City, Viet Nam

Presented by
Dr. LAIM Kimleng
Official, Provincial Department of Industry, Mines and Energy Sihanouk Ville, MIME.

1-Introduction

- My name is LAIM Kimleng. You can call me Leng.
- I worked for the Metrology Office of the Provincial Department of Industry, Mines and Energy in Sihanouk Ville.
- I have been working in metrology field for three years.
- Please see my organization chart of the Ministry of Industry, Mines and Energy as below:

Organization Chart



2-Legal Metrology System

- The Department of Metrology and the Metrology Offices in all provinces and cities are implementing the law and its regulation. All types of weighing instruments and its measuring ranges are covered by the metrology law. (Note: Article 29 of the draft metrology law).
- For inspection and verification, the Department of Metrology and the Metrology Offices in all provinces and cities are performed every year. There are three types of verification:

  a-Initial verification. (For new instruments before use and after repaired)

  b-Periodical verification or re-verification. (For used instruments, verify every year)

  c-Unexpected verification. (In the irregular case complained by costumers). (Note: Article 28 of the draft metrology law).
- Regarding to the verification, the number of instrument was increased from year to year.
- Currently, we do not have the type approval, but we are responsible for the type approval. (Note: Article 33 of the draft metrology law).

3- Situation on NAWI

- In my country, most of the Non Automatic Weighing Instruments (NAWI) use in the markets. There are no manufacturers of NAWI in my country. The weighing instruments were imported from China, Thailand and Viet Nam. We estimate that the percentage of the production of NAWI is below:

  a-Electronic weighing scales, approximately 8%

  b-Mechanical scales using a spring, approximately 74%

  c-Mechanical balances using a weigh beam and weights, approximately 18%

- The accuracy class is: class III and class IIII. The maximum capacity ranges are: 0.5kg, 1kg, 2kg, 5kg, 10kg, 12kg, 15kg, 20kg, 30kg, 60kg 100kg, 120kg and 150kg. But the most commonly used is the spring scales which its maximum capacity 15 kg.
- Regarding to the OIML R 76, my country was implemented through their procedure and it is the foundation for control and verification of NAWI.

4- Conclusion

- For the time being, there are some agencies involved metrology sector had supported my country. But we still have problems such as:

  -lacked of human resources,

  -inadequate physical standards,

  -the draft metrology law is still Inter-Ministries discussing at the Office of the Council of Ministers.

  Also, we are insufficient budget for running the legal metrology system.

5-Acknowledgment

- Finally, I would like to express my sincere thanks to all organizers and supporting organizations that have supported me for this training course and coordinated with my organization.

- Thank you for your kind attention.

Legal Metrology and its link to the protection of consumers in Chile.

Training Courses in Legal Metrology

Ho Chi Minh, Vietnam.
September 07.

Mauricio López Guzmán
Sociologist, Methodology Expert - SERNAC
(Government Consumer Protection Agency)

Self Introduction

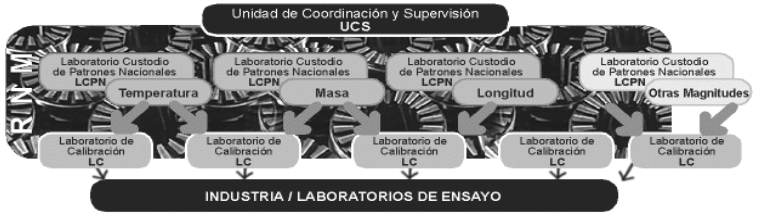
- My name is Mauricio Lopez. I am a sociologist, I work at SERNAC (Government consumer protection agency)
- Our main objectives are: make the market transparent, foster consumers' rights, and defend consumers from illegal practices by negotiating with the companies and taking these cases to court if necessary.
- I have worked at the research department for 10 years, doing market research and nowadays I am responsible for leading investigations and in charge of the methodology used.
- Within an international context and rights of its citizens at SERNAC we are sure that by making the market transparent and encouraging consumers' rights we are contributing to better the competitiveness of the economy in Chile.

Non Automatic Weighing Instruments (NAWI) in the economy of Chile

- The national network of Metrology (RNM) regulates the norms of metrology in Chile.
- There are two main types of laboratories. The first type of laboratories are the (LCPN) guards and administrators that calibrate and protect the national patterns and evaluate the second type of laboratories. The latter responsible for measuring the industry and applying the norms.
- The main objective of this network is to achieve an international measurement comparability, which facilitates international trade such as free trade agreements.
- The Non Automatic weighing instruments apply the following magnitudes or areas: temperature, longitude, mass, force, pressure, electrical magnitudes, flow of liquid ,and chemistry.

Legal metrology system in Chile

- The government normalization agency (INN) created the network that conducts the laboratory guards and the unit of coordination and supervision.
- Its objective is to calibrate the national industry with international recognize standards, in order to facilitate international trade.



Magnitude	Mass	Temperature	Longitude (in millimeters)
Range	1 mg a 10 kg	-40 a 965 ºc (its-90) for comparators	0,5-100 (short blocks);
maximum measurement capacity	class e2 (oiml)	0,0001 ºc	100-500 (long blocks); diameter 300 max.
Range	20 kg		class 0 (short blocks ISO);
Maximum measurement capacity	class f1 (oiml)		class 1 (long blocks ISO)
Range	50 kg		ø 10 - 300; hmax 150;
Maximum measurement capacity	Class f2 (oiml)		Roundness, Coaxial, concentrical, cylindrical and straightness of axis. Roundness: 0,03 µm, cilindrical: 1 µm/100 mm of height

Magnitude	Pressure	Electrical variables
Range	hidraúlica: 0,5 a 140 mpa (p. Relative)	University of Concepcion, Chile
maximum measurement capacity	100 ppm	
Range	neumática: 0,0014 a 7 mpa (p. Absolute)	
Maximum measurement capacity	45 ppm	
Range	vacío: -3 a -100 kpa	
Maximum measurement capacity	200 ppm	

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Legal metrology system in Chile

Laws and Agreements

- Decreto Supremo nº 775/1999 MINECOM- Masa y Temperatura.
- Decreto Supremo nº 487/2000 MINECOM- Fuerza.
- Decreto Supremo nº 096/2001 MINECOM- Longitud.
- Decreto Supremo nº 076/2003 MINECOM- Presión.
- Chile y la Convención del Metro.
- Chile y el Acuerdo de Reconocimiento Mutuo del CIPM

Agreements

- Reconocimiento del Sistema Interamericano de Metrología, SIM.
- Centro Español de Metrología, CEM (España).
- Centro Nacional de Metrología, CENAM (México).
- Bureau de Normalization du Quebec, BNQ Canadá.
- Bureau National de Metrologié, BNM (Francia).
- Reconocimiento Mutuo con los laboratorios SURAMET (INTI-Argentina; INTN-Paraguay; INMETRO-Brasil; LATU-Uruguay, INN-Chile).
- Comité Internacional de Pesos y Medidas, CIPM

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Legal metrology and consumers.

- If the process of production, especially within the food industry, does not apply international measurement patterns it causes an a increase of price which is paid by the consumer.
- From the perspective of consumer rights, the measurements conducted without due traceability, lack credibility and have a negative impact on the price of the product.
- Within the context of the consumer rights we can find the right of credibility which means that a product should have, and weight what it stipulates on its labels. This principle can only be carry out with international standards.
- This is all possible if and only the measurement instruments are constantly verified and updated to continually improve our economy.

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Situation in Chile about the compliance to the international standards

- The methodology used in Chile to apply international standards is: a group of experts, such as government representatives businessmen and consumers get together and agree on how to implement national and international standards.
- Explain current situation in your economy about the compliance to the international standards / recommendations, such as OIML R76?
  (I will get back to you on this on Friday)

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Are there any other requirements from your economy? Do you have any problems in order to implement the legal metrology system (budget, human resources, etc.)?

In order to execute and implement the requirements it is necessary to:

- Communicate benefits and achievements
- Have an impact of policies
- Provide adequate training to small and mid sized business

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Legal Metrology and its link to the protection of consumers in Chile.

Training Courses in Legal Metrology

Ho Chi Minh, Vietnam.
September 07.

Mauricio López Guzmán
Sociologist, Methodology Expert - SERNAC
(Government Consumer Protection Agency)

Mr. President,

Ladies and Gentlemen:

My name is Zhu Xuming, come from Shanghai Institute of Measurement and Testing Technology. On behalf of our economy, I would like to express my sincere thanks to you for inviting me to the training course!

In my economy, non automatic weighing instruments usually means scales. It is classified into three categories, such as electronic weighing scales, mechanical scales using a spring and mechanical steelyards. For example in shanghai, non automatic weighing instruments used in trade commerce may be found in supermarket, agora, shop and so on. Most of them are the price-computing instruments and price-labeling instruments which maximum capacity is 15 or 30 kilogram. In industry, enterprise in metallurgy, chemical, machine, harbor affairs, logistics etc. also use electronic truck scale, hopper scale, bench scale, electronic steelyard and so on.

Our government implements the measurement law, and measure organization authorized by the government will perform the verification, re-verification and type approvals. Verification period of these instruments will be administered according to their verification regulations, annually in general. My economy adopts JJG 555-1996 Verification Regulation of non automatic weighing instruments to be nearly equivalent to OIML R76.

I enjoyed training and talking to you, and sharing the time together. As we say, well begin is half done. I hope we will be able to maintain this good relationship and make further another great one together.

I wish the conference a great success.

Thank you.

Legal Metrology in Hong Kong Special Administrative Region

Presented by Jeff C H TRAN

Government Laboratory

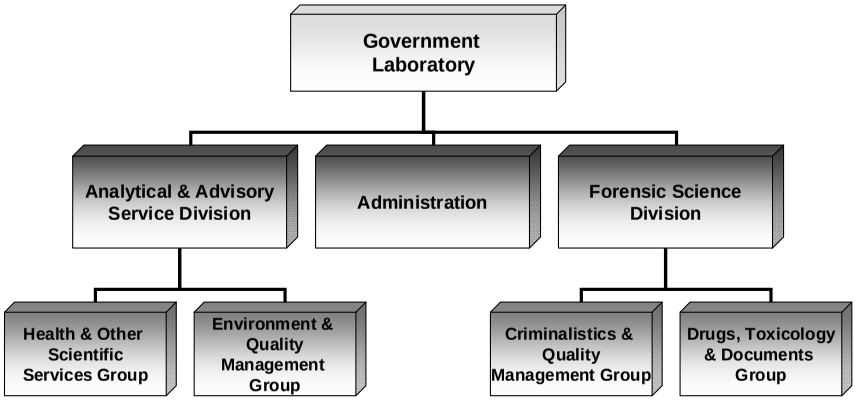
Government Laboratory

1. The Government Laboratory has been established since 1913.

2. We provide a full range of analytical, investigatory and advisory services to various Government Departments in Hong Kong.

www.govtlab.gov.hk

Government Laboratory



Government Laboratory

1. Client departments of the Forensic Science Division include:
   - Hong Hong Kong Police Force
   - Fire Services Department
   - Immigration Department

2. Client departments of the Analytical & Advisory Services Division include:
   - Environmental Protection Department
   - Department of Health
   - Food and Environmental Hygiene Department
   - Customs & Excise Department
   - Fire Services Department

Legal metrology system in Hong Kong

1. OIML Recommendations are not literally adopted in the law of Hong Kong.

2. However, the Weights and Measures Ordinance, Cap 68 states that no person shall in the course of trade supply to another person any goods by weight less than which corresponds to the price charged for those goods.

Legal metrology system in Hong Kong

1. For the degree of tolerance for the deficiency in weight, it is not specified in the Ordinance.

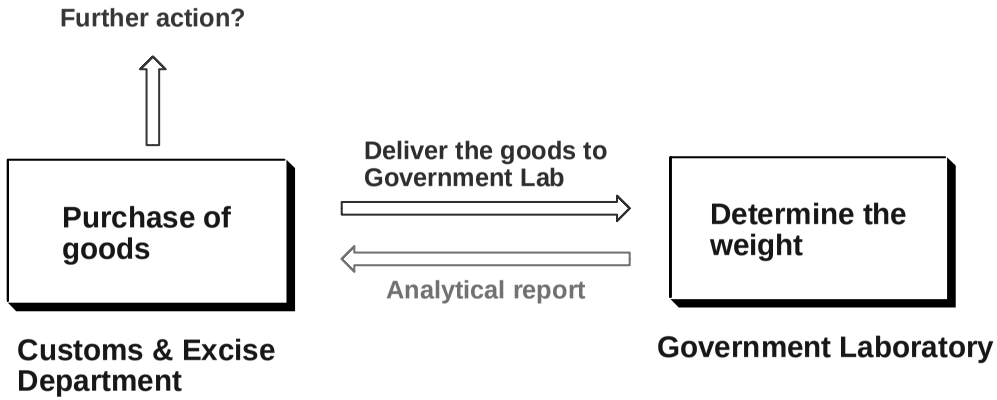
2. Customs & Excise Department is the law enforcement department in Hong Kong responsible for the determination of acceptable tolerance for the deficiency of weight on a case-by-case basis.

Role of the Government Laboratory

1. We provide analytical and advisory support to the Customs and Excise Department in the enforcement of the legislation.

2. We determine the weight of the goods delivered to our laboratory by the Customs & Excise Department.

Role of the Government Laboratory



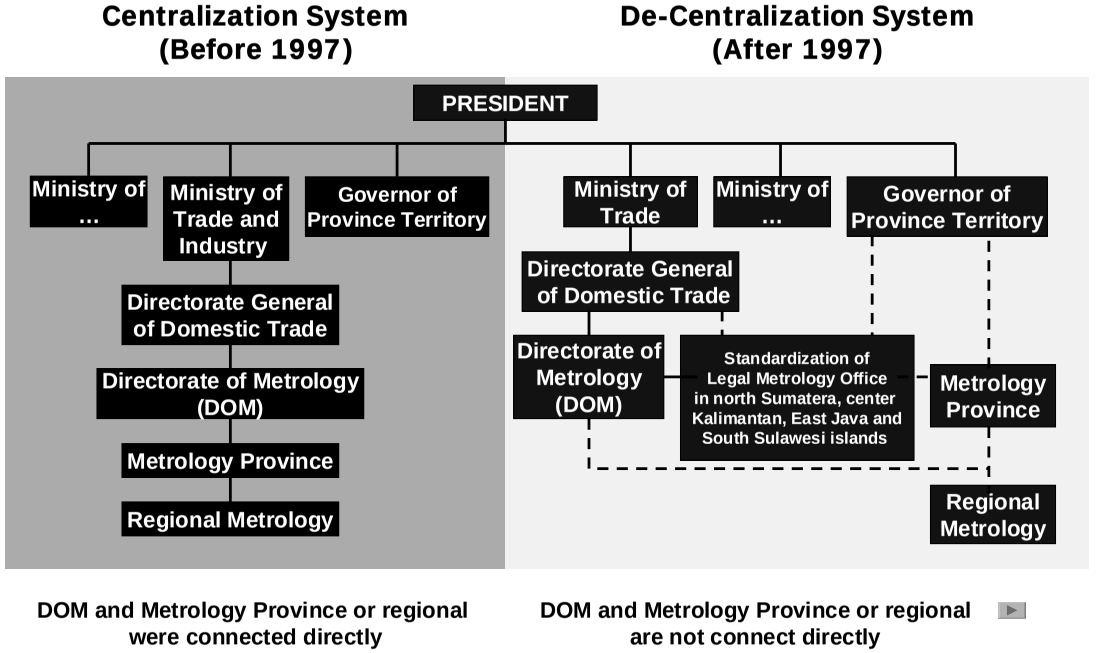
Thank you for your attention

TRAIN THE TRAINER COURSE ON
THE VERIFICATION OF MECHANICAL WEIGHING SCALES
September 25th~28th, 2007
in VIETNAM

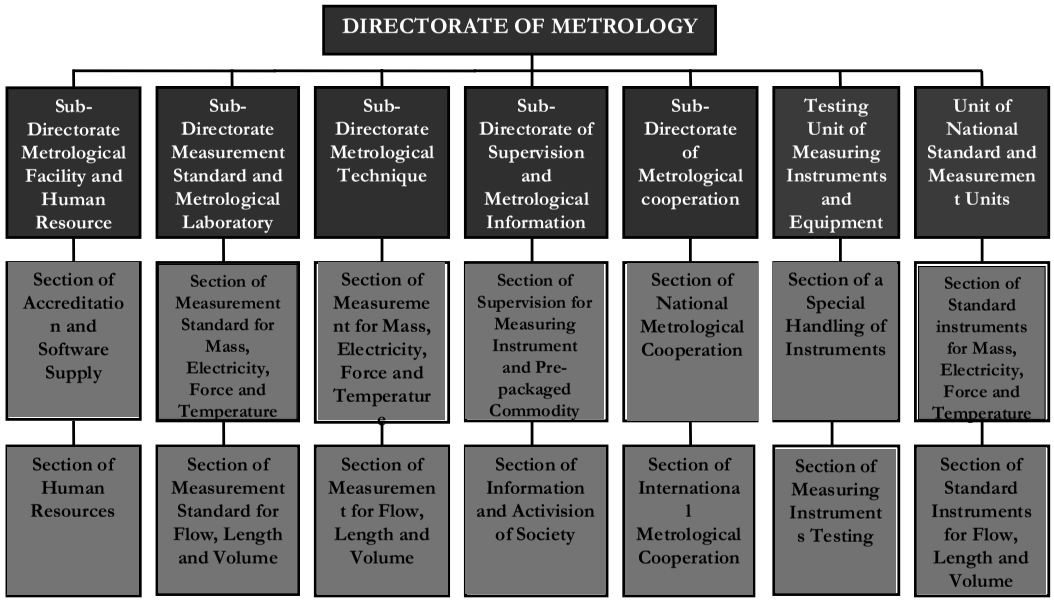
Presented by
ARIPIN MASKOSUDITRO

DIRECTORATE OF METROLOGY
DIRECTORATE GENERAL OF DOMESTIC TRADE
THE MINISTRY OF TRADE OF THE REPUBLIC OF INDONESIA

Government Organization Structure



The Organizational Chart of Directorate of Metrology



Experience in my organization

- To carry out the legal metrology control.
- To carry out the law act to user which evade the law of legal metrology.
- To verification and re-verification of legal measuring instruments for mass, volume, length and balance.
- To Calibrate the technical metrology instruments.
- To follow the training course on volume determination of fixed storage tanks in West Germany.
- To follow the training course on CNG fuel dispenser in Malaysia.
- To follow in house seminar.

NAWI in my economy

- The unit price is cheaper.
- It's belong to legal metrology instruments.
- The most of NAWI forms domestic production and there are many choice of maximum capacity.
- Most of them to be used for measuring weight of things, goods, commodities at traditional market with lower accuracy.
- It's simple technology, so it's easy to be used, maintenance and get it inland trade.
- Until now there are 14 manufacturers of NAWI.

- Approximately, total number of production is about 50,000 pieces of NAWI
- Approximately, for period of time from January to July 2007 ratio of numbers in use for :

  a). Electronic Weighing Scales : 3.14 %

  b). Mechanical scales using a spring : 0.42 %

  c). Mechanical balances using weigh beam and weights : 96.86 %
- The most commonly used :

  a) Accuracy class II and III

  b) The maximum capacity : 500 kg

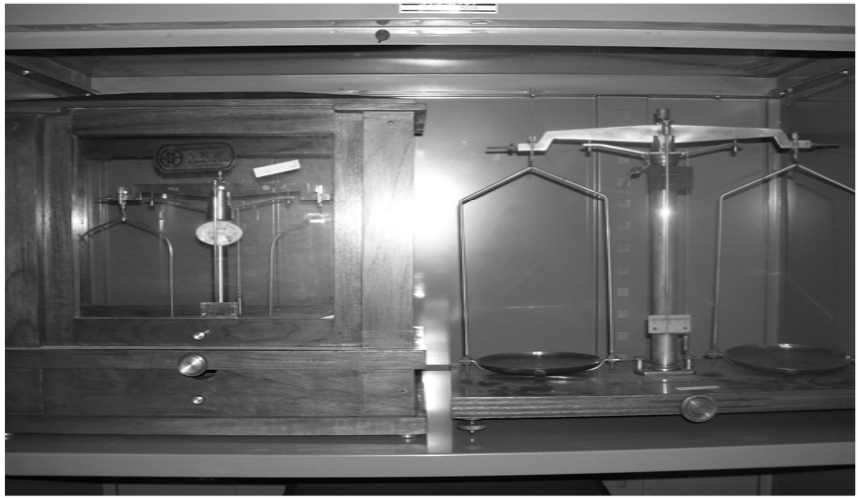
Legal Metrology System in my Economy

- The Legal Metrology Services have been implemented by government (under Directorate of Metrology and Regional Metrology Unit).
- The Technical/Science Metrology Services have been implemented by Metrology Institute (under the Indonesian Institute of Sciences).
- The Nuclear Radiation Metrology Service have been implemented by government body (under the National Atomic Energy Board).
- The calibration/testing services have been implementing by calibration/ testing laboratory which has been getting an accreditation certificate from the national accreditation committee.

- The units of measure used for mechanical weighing instruments are International system units, for example : kg, g.
- Each new product types neither imported or domestic product of the weighing instruments before selling and or using for commodity transaction are required the type approvals first.
- The type approval of legal metrology instruments are only issued by Directorate of Metrology.
- Initial verification and re-verification are required.
- Verification of weighing instruments have been carrying out by inspectors of regional metrology offices.
- Re-verifications can be performed neither at the regional metrology office nor the other place of services.
- The re-verification period is one year.
- Number of verification is performed in a year for about 60,300 instruments. They are decreasing each year.
- Number of type approval tests are performed in a year for about 60 instruments.

The Types of Weighing Instruments

Name	: Centesimal Balance
Max. Capacity	: 500 kg
A scale interval	: 0.2 kg
The Ratio of	: 1 to 100

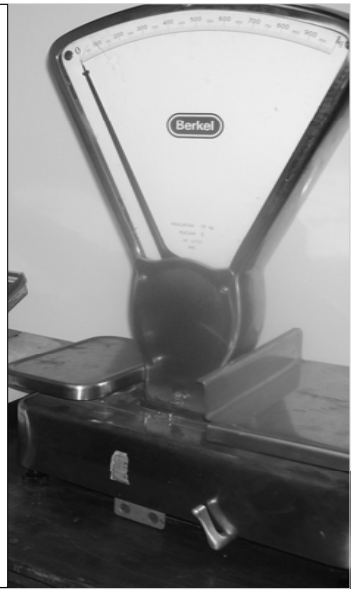


Name	: Gold Balance
Max. Capacity	: 1 kg
Type	: Multi Interval
The Ratio of	: 1 to 1

Name	: Medicines balance
Max. Capacity	: 1 kg
Type	: Multi Interval
The Ratio of	: 1 to 1

Name	: Table Balance
Max. Capacity	: 10 kg
Type	: Beranger
The Ratio of	: 1 to 1

Name	: Quick Table Balance
Max. Capacity	: 10 kg
A scale interval	: 0.1 kg



Current Situation in my Economy

- All of the weighing instruments are subject to OIML R-76.
- Since year 2001 stamp ordinance has been changed to be a special technical requirements of non automatic weighing instruments which was adopted from OIML R-76.
- After this regulation holds for all of non automatic weighing instruments, there are some problems among other things;
  - How way to determine the verification scale interval of weighing instruments which are not equipped a scale interval ?
  - What is our wisdom if the minimum number of verification scale interval of weighing instruments are not comply with OIML R-76 ?
- The certificate of weighing instruments can not be received internationally yet.
- All of the type approval tests could not be performed completely because of limitation on budget, test standard and capability of human resources.

The Other Requirements in my Economy

- Measurement Law : No. 2, 1981 Regarding Legal Metrology
- Regulations :
  1. No. 2, 1985 concerning Measuring Instrument subject to verification
  2. No. 10, 1987 concerning Legal Units of Measurement
  3. No. 7, 1989 concerning the National Standardization Council
  4. No. 2, 1989 concerning the National Standards for Measurement Units,

  and so on.

Thank you very much for your attention

Legal Metrology in DPR Korea (Non-automatic Weighing Instruments)

2007, 9,25

Self Introduction

- Central Institute of Metrology(CIM) is under the State Administration for Quality Management(SAQM), DPR Korea.
- CIM was founded in 12th, April, 1950. CIM is the centre of scientific research and verification in the field of metrology, and has about 30 laboratories and verification departments including length, time, mass, temperature and etc.
- I work at the mechanics measurement laboratory in CIM.

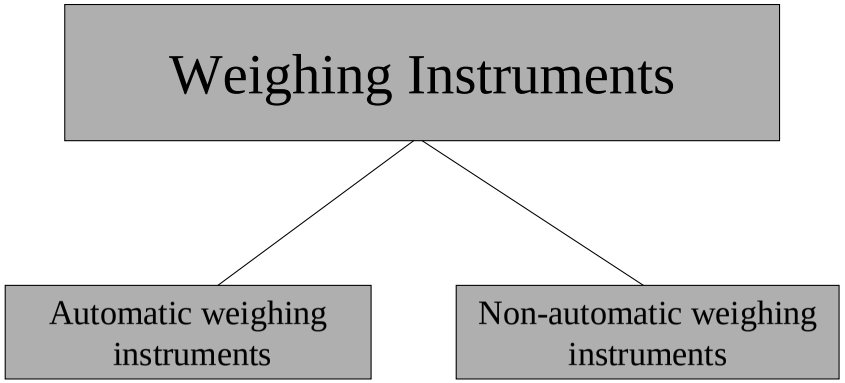
Non-automatic Weighing Instruments

- NAWI used in commerce and industry
- About 10 manufacturers
- Total number of production unknown
- Ratio of numbers of mechanical scales is approximately 80%
- Maximum capacity is between 1 ~ 150kg and their accuracies corresponds to class Ⅱ, Ⅲ in OIML R76-1 and class Ⅲ commonly used.

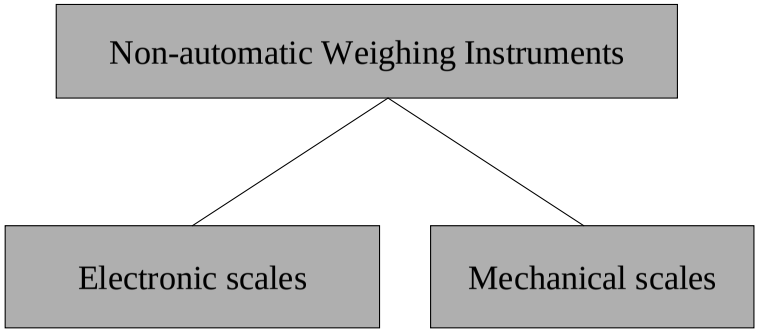
Legal Metrology System in DPR Korea

- Implemented according to the law on metrology of DPR Korea and rules.
- Carried through by SAQM, CIM, verification offices in each provinces, cities and counties and self-verification departments.

Legal metrology system



Legal metrology system



Legal metrology system

- All the weighing instruments are registered in verification authorities and subject to mandatory initial verification and reverification.
- Reverification period; 1 or 2 years
- Number of verification increasing yearly.

Legal metrology system

- SAQM responsible for the type approval of NAWI.
- CIM and verification authorities responsible for their test.
- Number of type approval unknown

Compliance to international standards and OIML R76

- Verification of NAWI is carried out according to our national standard.
- Efforts being made to conform it to OIML R76

problem

Some problem in implementing the legal metrology system such as the shortage of budget.

Thank you for your attention

NON AUTOMATIC WEIGHING AND MEASURING INSTRUMENT IN MALAYSIA

By
Peter J. Berinus Agang
Assistant Director
MINISTRY OF DOMESTIC TRADE AND CONSUMER AFFAIRS, MALAYSIA

MALAYSIA

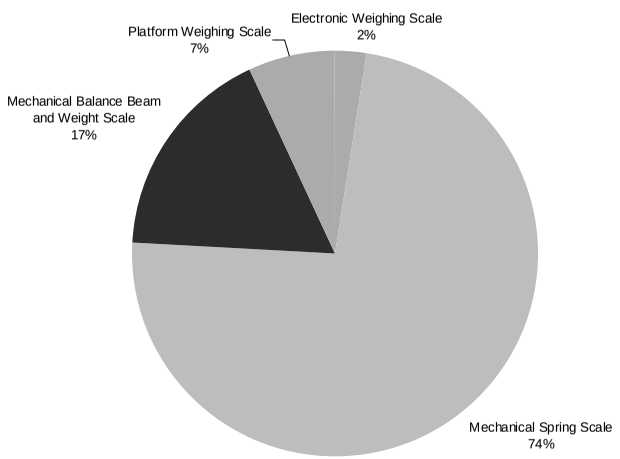
MALAYSIA

- **Consist of 13 state where 11 state in Peninsular Malaysia and 2 state in Borneo Island.**
- **Federal Territory 3 state Kuala Lumpur,Labuan and Putrajaya**
- **Malaysia National Capital is Kuala Lumpur**
- **Federal Government Administration Centre at Putrajaya**
- **Multi racial country with 26 million population**
- **Comprising three main ethnic Malay, Chinese, Indian and indigenous races**

Non Automatic Weighing and Measuring Instrument in Malaysia

- Target used for NAWI :
  - For accurate weighing and measurement for sale and purchase in retail outlet.
  - To protect the consumer from short weight and measurement
- Only one NAWI Manufacturer in Malaysia.
- Number of production a year 5000 pieces
- Number of Weighing and Measuring instrument verified and re-verified in Malaysia 243,205 pieces

Number of Weighing and Measuring Instrument in Malaysia



Class Accuracy and Maximum Capacity for Verification of Weighing and Measuring Instrument

- Accuracy base on the Pattern or Specification for Weight or Measures or Instrument for Weight or Measuring Order 1981.
- Accuracy class base on the class prescribe by the Order:
  - Class “B” for precious metal, pharmaceutical product
  - Class “C” for other retail product.
- The different within the class are:
  - The Sensitivity and the permissible error
- Range from 30 gram to above 100 kilogram
- Common used class “B”

LEGAL METROLOGY IN MALAYSIA

- Weight and Measure Act 1972 (ATS)
  - Regulated and governed by Enforcement Division under the Ministry of Domestic Trade and Consumers Affairs. (MTDCA)
  - Section 14 of Weight and Measure Act require mandatory verification and re-verification for all weighing and measuring instrument used for trade
  - Enforcement of the act carried out by Weight and Measure Inspector

VERIFICATION OF NON-AUTOMATIC WEIGHING INSTRUMENT IN MALAYSIA

- Before April 2005, verification and re-verification done by Weight and Measure Inspector under Enforcement Division.
- The service was privatizes in April 2005, verification and re-verification of weighing and measuring instrument used for trade in Malaysia done by Metrology Corporation Malaysia Sdn Bhd (MCM).
- After the privatization, Weight and Measure Inspector only enforcing the Weight and Measure Act and oversee the company performance.
- Every Working Standard used to perform verification is traceable to National Standard manage by National Metrology Laboratory (SIRIM)

Type of Weighing and Measuring Instrument

- **Section 14 (5A) Weight and Measure Act required all weighing and measuring instrument must obtain Custodian approval before can be used for trade.**

(a) linear measures;
(b) liquid capacity measures;
(c) weights;
(d) beam-scales;
(e) balances;
(f) counter machines;
(g) spring balance and scale;
(h) dead-weight machines;
(i) platform weighing machines;

Type of Weighing and Measuring Instrument

- **(j) weighbridges;**
- **(k) crane weighing machines;**
- **(l) automatic weighing machines;**
- **(m) instrument for measurement of liquid fuel lubrication;**
- **(ma) liquefied petroleum gas dispenser;**
- **(mb) parking meters and time recorders;**
- **(n) instrument for the measurement of alcoholic liquor;**
- **(o) any other instrument for weighing or measuring approved by Custodian, from time to time.**

VERIFICATION AND RE-VERIFICATION

- **Weighing and Measuring instrument will be serviced by licence repairer before verification or re-verification can be perform**
- **Verification and re-verification will be conducted by Verification Officer from MCM**
- **Verification interval is 12 month**
- **New weighing and measuring instrument must obtain Custodian pattern and specification approval before can be used for trade**

INTERNATIONAL RECOMMENDATION AND OTHER REQUIREMENT

- **Verification and re-verification of weighing and measuring instrument base on the Pattern or Specification for Weight or Measures or Instrument for Weight or Measuring Order 1981.**

- **No problem to implement the legal metrology system in Malaysia because every weighing and measuring instrument used for trade shall be verified**

- THANK YOU

LEGAL METROLOGY FOR NON AUTOMATIC WEIGHING INSTRUMENTS (NAWI) THAT USE IN MEXICO

1 Introduction

In Mexico, the metrology it's organized and constructed across the National System of Calibration, which is formed by the National Center of Measurement (CENAM), the accredited laboratories and other experts in the matter, which function consists on giving technical services of certification and calibration that try to get the uniformity and reliability of the measurements related to the commercial transactions and on services, as in the industrial processes, scientific research and technological development, that are taking place in the country.

In the aspect of the Legal metrology, The Consumers Federal Attorney (PROFECO) controls by checking the fulfillment of the Federal Law of Protection of the Consumer, Federal Law on Metrology and Standardization, as well as the Official Mexican Standards, related to the technical and legal requirements, among others, who have for object assure exact measurements that should guarantee the transparency and equity of the commercial transactions, as well as assure the relations of consumption in goods and services.

1.1 About the Organization and the Department

The PROFECO is a decentralized institution of social service, with juridical personality and own patrimony, created in the year of 1975 with the general aim to promote and protect the rights of the consumers. The powers and PROFECO's attributions are established in the Article 28 of the Political Constitution of the United States of Mexico, the Federal Law of Protection to the Consumer and its different Regulations, The Organic Statute of the PROFECO, the Federal Law on Metrology and Standardization as well as the Federal Law of Economic Competition.

The principal function is the defense of the consumer opposite to the unjust practices in the relations of consumption, assuring conditions of quality and competition in the provision of goods and services on the market.

Check and Alertness.

The PROFECO, across the Check and Alertness General management of the Sub attorney's office of Check, it's in charged of monitoring that the legal metrology of the country is fulfilled, across the alertness of the Federal Law of Protection to the Consumer, Federal Law on Metrology and Standardization, official Mexican procedure and any other standard in the matter, emitted by the Secretariat of Economy;

Across his departments of check, particular case the Department of Metrology Checking, which takes charge of checking and monitoring official Mexican procedure applicable to instruments of measurement, providing the supplier and user, safety about the quality and quantity of the products and services that are commercialized, avoiding this way, conflicts among suppliers and consumers.

1.2 Professional experience inside the organization

The general management of Check and Alertness, across the Department of Checking, coordinates and supervises the actions of checking in legal metrology, by the alertness of the Official Mexican Procedure relative to instruments of measurement, on agreement to the established programs; additional it coordinates and supervises the services of check for calibration and adjustment of instruments of measurement by request of divides principally, beside taking part in the committees and subcommittees of normalization in the matter.

2. Non automatic weighing instruments in the Mexican economy.

Inside the Mexican economy, diverse instruments are in use for measuring and determining the price or tariff of the products or services that are commercialized, among these the most important are the instruments of measurement of not automatic functioning, named scales, which are used in commercial transactions on public markets, flee markets, malls, supply centers, that is to say, those in which it is important the weight of the product to determine the price to be paid by the consumer.

In this respect, Profeco carries out actions to check the functioning of the scales, as well as of other instruments of measurement, monitoring that the above mentioned instruments indicate the quantity in weight of the products that are acquired and that the consumer should possess(should rely on) the sufficient information to distribute the appraised quantity, which allows the supplier to realize in a more efficient way his commercial labor, on having guaranteed that the scales are in appropriate conditions of functioning.

2.1 What are the major purposes of NAWI

To give fulfillment to the Federal Law on Metrology and Standardization, although this one indicates that in any commercial, industrial transaction or of services, which is carried out based on quantity, this one will have to measure up using the instruments of measuring adapted, for which, the scales are the instruments of measurement adapted to determine the weight of a product and to estimate the cost of the same one.

2.2 How many manufacturers NAWI in Mexican economy?

We do not possess reliable statistics, it’s estimated that they are about 40 scales producers in Mexican economy.

2.3 Do you know the approximate number of the production of NAW?

Does not possess the information

2.4 Do you know the (%) of instruments of measurement of not automatic functioning

It’s estimated that in Mexico they are in use:
- 2,150,000 scales of low scope
- 1,250,000 scales of medium scope
- 63,000 scales of high place reach

(a) For the electronic scales
It estimates that 39 % of the previous information.

(b) For the mechanical scales using a spring
60 % of the previous information

(c) The mechanical balances using a girder and weight.
1 % of the previous information.

2.5 Which is the class of accuracy and the maximum capacity, of the most used instruments in general?

Ordinary and average, it is the class of accuracy of the instruments of measurement most used in the Mexican economy, with capacity of measurement from 1 to 5 000 kilograms.

3. System of legal metrology in the Mexican economy.

Since already I mention, the organization, structure and operability of metrology in Mexico, it is sustained in the dispositions(regulations), limits and criteria from the General Conference of Weight and Measures (CGPM), Legal's Metrology International Organization (OIML) the Convention of the Meter and the International Office of Weight and Measures (BIPM).

The Federal Law on Metrology and Normalization constitutes the legal foundation on Metrology and Measurement. This Law establishes the General System of Units of Measure according to the International System of Units (SI), gives the National System of Calibration (SNC) as a way of official recognition and accreditation of laboratories that give services of calibration and creates Metrology National Center(CENAM) that acts as primary Laboratory of the National System of Calibration, which function consists on giving technical services of certification and calibration that try to get the uniformity and reliability of the measurements that are realized in the country related the commercial and service transactions so much as in the industrial processes and in the scientific investigation(research) and technological development.

The PROFECO plays an important roll on the fulfillment of the legal Metrology, by means of the check of the binding of the Federal Law on Metrology and Standardization , Official Mexican Procedure and other regulations in the matter, for which takes charge monitoring that the instruments and methods of measurement related to the technical and legal requirements, assure exact measurements that should guarantee the transparency and equity of the commercial transactions and to guarantee the relations of consumption in goods and services.

3.1 Who carries out the operability of the binding of the regulations (Government, Institute of the metrology, the check corps, test laboratory, etc.)?

The PROFECO takes charge checking that Official Procedure are binding by the established in The Federal Law of Protection to the Consumer, Federal Law On Mexican Metrology and Standardization , as well as the List of instruments of measurement which its initial or periodic or extraordinary check is obligatory, and the rules to carry out it.

3.2 Describe briefly the types of instruments to weigh and his scope of measurement, which they are covered by the standardization in the matter.

Inside the context of the instruments for non automatic functioning, there are in use the scales, which are divided as follows:

Mechanical Scale: Fit out instrument with mechanical components that when we load up on the receptor brings strength over the crowbar, crowbar system or spring, that switched on the warning device provides of readings in units of mass.

Electronic scale: Instrument equipped only with electronic components, which on having placed a load on the recipient exercises a force on a transducer of efforts or set of them, which connected to the warning device, provides readings in units of mass.

Electromechanical scale: Instrument equipped with mechanical and electronic components, which on having placed a load on the recipient of load exercises a force on a lever or a system of levers connected to a transducer of efforts or set of them that in turn connected to the warning device provides readings in units of mass.

Since already it was mentioned, the majority of the scales that are in use inside Mexican economy, are inside a scope of measurement of 1 up to(even) 1 500 kilograms, which happen of as it is established on the Official Mexican Norm NOM-010-SCFI-1994, Instruments of measurement - instruments for not automatic functioning - technical and measurement requirements.

3.3 Is the initial check and the re-check needed? If it is affirmative, that organization realizes the check? Is all the time the re-check period? How much checking is realized in one year? Do they increase or diminish?

About the instruments of measurement which initial, periodic or extraordinary check is obligatory and the rules to carry out it, the owners of new scales are forced to request the initial check of the instrument, later and in an annual way. If the scale presents variations in the result of the measurements or loses the condition of checked instrument, they will have to request an extraordinary check.

About the Instruments above-mentioned, the checking requests can be presented to the Profeco or to the particular companies credited for it, known as Accredited Units of Check (Uva's).

Annually the Profeco carries out the checking by request of part, closely of 7000 scales among 1 and up to 1, 500 kilograms.

3.4 Are approvals needed? If it’s affirmative, how many approval tests are realized in one year?

Of conformity with the Federal Law on Metrology and Standardization, the measurement instruments made on national territory or imported and that are subject to official Mexican norm, need, previous marketing, approval of the model or prototype.

In this respect, it is the general management on Procedure of the Secretariat of Economy, is in charged of requesting the necessary for the model (models') approval or prototypes of the scales.

4. Explain the current situation in your economy on the conformity to the international standards, such as OIML R76?

Although the metrology in Mexico, is sustained on regulations, limits and criteria come from the General Conference of Weight and Measures (CGPM), Legal's Metrology International Organization (OIML) the Convention of the Meter and the International Office of Weight and Measures (BIPM), likewise, relies on the general system of units and measures, which is based on the International System, Mexico possesses the Official Mexican Standard NOM-010-SCFI-1994, Instruments of measurement – non automatic functioning weight instruments - technical and metrological requirements, applicably to the instruments named scales.

Official Mexican Standard, of which PROFECO checks the binding in those instruments of measurement that are used in commercial transactions.

5. There are other requirements in your) economy? Are there any problems to put the metrology legal system in execution (budget, human resources, etc.)?

The regulations mentioned previously in the text, is the in force one in the Mexican economy.

The principal problematic of the country, diffusion of the regulations is quite poor, for what ignorance on the same exists and conjugates with the lack of interest to get up-to-date in the matter.

MASM

MONGOLIAN AGENCY FOR STANDARDIZATION AND METROLOGY

1. Self introduction

- Name: GANDOLGOR TSedenbaljir
- Qualification: engineer-economist
- Working experience: Verification officer of NAWI in MASM, 1978 - present

MAP OF MONGOLIA

Location: Northern Asia, between China and Russia

Capital: Ulaanbaatar

Total population: 3.0 million (July 2006 est)

Area: 1.565 million sq km.

1.1 MASM

Mongolian Agency for Standardization and Metrology is a Government regulatory agency responsible for coordinating and managing the standardization, metrology, testing and quality sector throughout the country. MASM reports to the Deputy Prime Minister of Mongolia

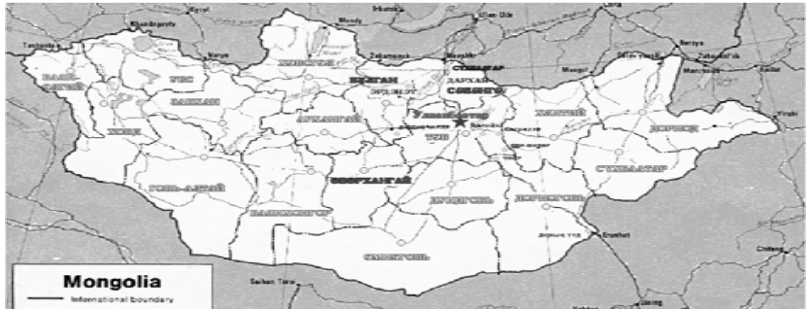
Mission

To contribute to the social and economic development of Mongolia in conjunction with the development strategic tendency by applying standardization, quality and metrology.

1.1 MONGOLIAN AGENCY FOR STANDARDIZATION AND METROLOGY

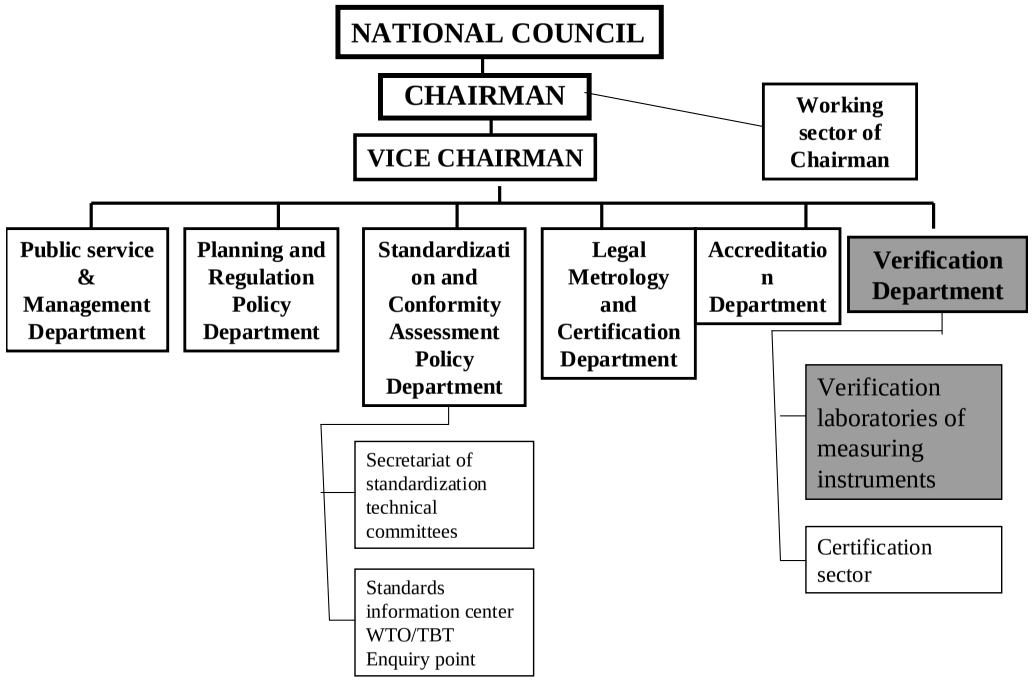
- **The main functions are:**
  - Standardization
  - Certification
  - Establishment of national measurement standards
  - Legal metrology
  - Accreditation
  - Training and consulting
  - International cooperation

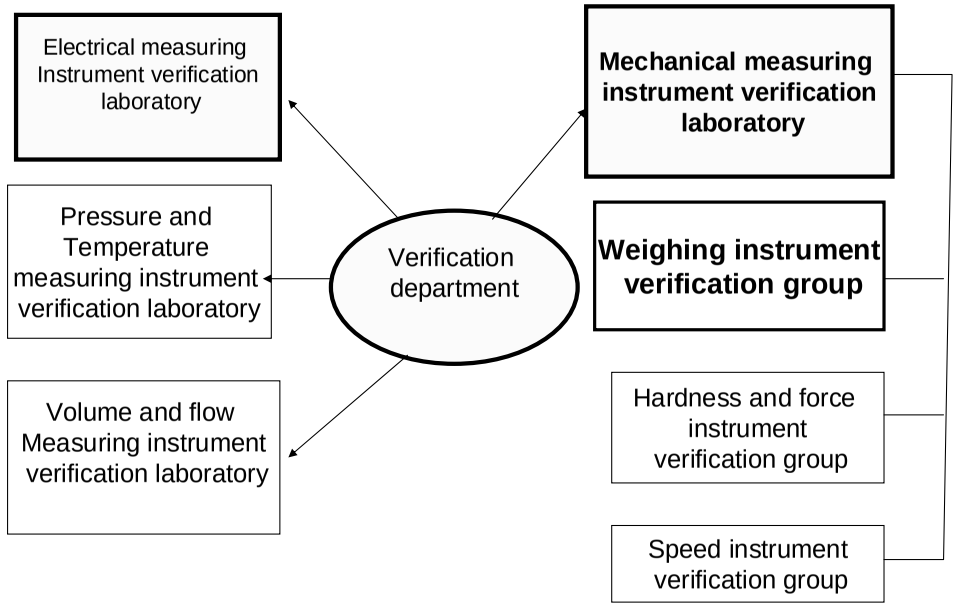
1.1 BRANCHES OF MASM



MASM possesses twenty two branches in administrative regions of Mongolia. Calibration and Verification Laboratories, which were accredited by National Accreditation Body, realize measurement policy in those regions.

1.1 MASM chart





1.1 Verification laboratories of measuring instruments

Verification laboratories of measuring instruments has 2 primary functions. These include:

- verifying all measuring instruments using for trade, safety, health and environment purposes
- checking pre-packaged articles and trading practices

2. NAWI in our economy

2.1 Major purposes or targets to use NAWI are:

- to provide for the uniform use of mass unit throughout Mongolia
- to enable individuals and organizations to make measurements competently and accurately

2.2 There is not any manufacturer of NAWI in our economy yet.

2.4 Total number and ratio of NAWI in Mongolia

NAWI	In Ulaan-baatar	In branches	Total in Mongolia	ratio
A. Electronic	1200	3300	4500	81.8%
B. Mechanical with spring	0	0	0	don't use in legal metrology
C. Mechanical with weigh beam	5300	15000	20300	18.2%
	6500	18300	24800	100%

2.5 Accuracy class and Max capacity of NAWI in common usage in Mongolia

NAWI	Retail scales		Weighbridges	
	accuracy	max	accuracy	max
Electronic	III	30kg	III	150t
Mechanical	III	10kg	III	30t

3. Legal metrology

- Law on Traceability of Measurement Uniformity of Mongolia was adopted by Parlament in 1993 and was renewed in 2003. The purpose of the law is to define legal basic for providing traceability of measurement uniformity and metrological control and to regulate relations between the government, citizens, business entities and organizations occurred in the implementation process thereof. **3.1** According to the law legal traceability is implemented by the Legal Metrology and Standards department and Verification Department of MASM.

Weighing instrument verification group /3.2-3.3/

Weighing instrument verification group holds standard weights of 0.001g to 50kg of accuracy F_1 and M_1 which are traceabled to the primary mass standards of MASM and performs the initial verification and re-verification of weighing instruments with in measuring range of 0.1g to 150 000kg.

The re-verification period is 0.5 year for mechanical weighing instrument, 1 year for electronic weighing instrument.

3.4 The approval of patterns

- Legal Metrology and Standards department's standard laboratories of MASM is responsible for the pattern approval of measuring instruments. They performed 1 types approval tests in last year, have performed 1 tests in this year on imported weighing instruments.
- According to the law, the measuring instrument which has pattern approval certificate issued by the national metrological body of its manufacturer is agreed.

4.Current situation

- OIML R76 was translated into Mongolian language and was adapted in 2003 as a national standard.
- In my opinion the value of the maximum permissible errors given in clause 3.5 of the OIML R76-1 is litle more. But we have not received any complaint about that from customers.

5. Problems

Lack of working standards in legal metrology. For example: There are 150 weighbridges /Max=150t/ in Mongolia at present time. Our laboratory has 9 only tonne of working standard weights in total.

THANK YOU

National Metrology Service - INDECOPI

(Servicio Nacional de Metrología - INDECOPI)

Aldo Martín Quiroga Rojas
Responsible Technical Incumbent

September, 2007

South - America

INDECOPI

•1983 - SNM - ITINTEC (Law N° 23560)

•1993 - SNM - INDECOPI (DS-024-93/ITINCI)

- ISO 9002:1994

- ISO 9001:2000

INDECOPI

ADDRESS: Calle de la Prosa 138, San Borja

Lima 41 - PERU

TELEPHONE: 51-1-2247800. (1331)

Deutscher Kalibrierdienst (DKD)

Physikalisch-Technische Bundesanstalt (PTB)

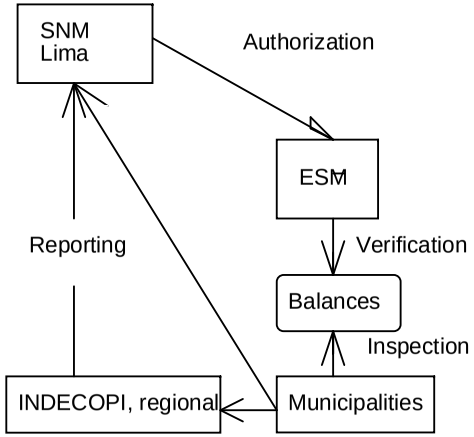
DAR registration number: DKD-K-35001

2003-01-13

Manufacturers of NAWI

Electronic balances

Procedure for ensuring conformity to regulations



INDECOPI, Regions

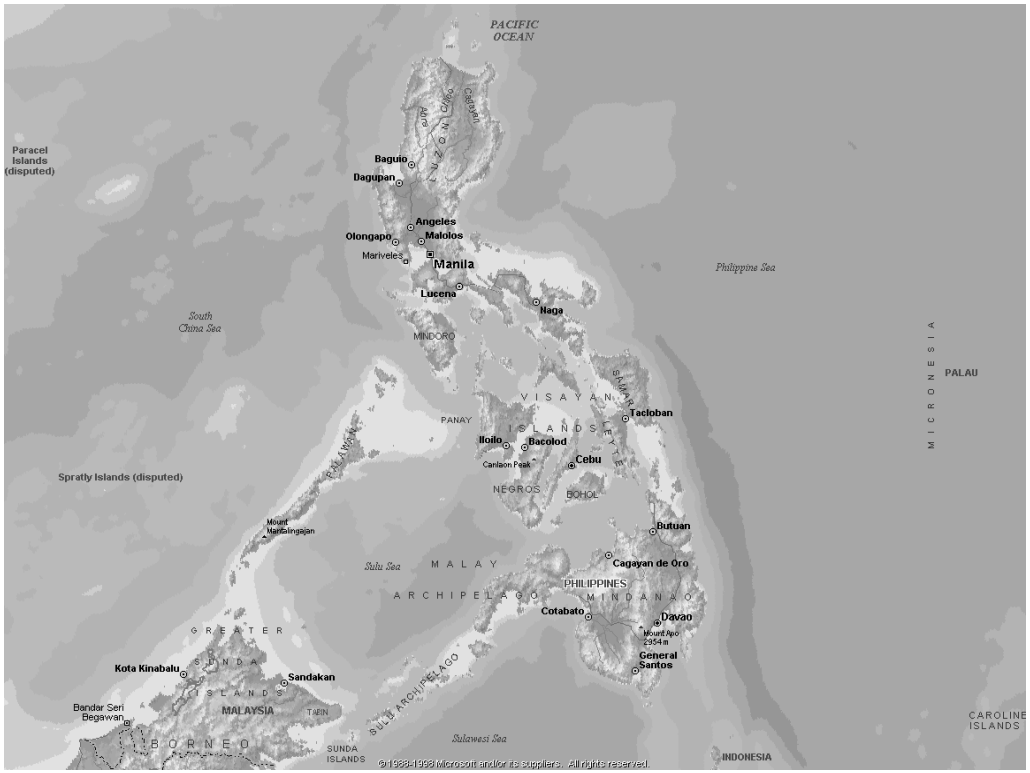
APEC/APLMF Train the Trainer Course on the VERIFICATION OF NON-AUTOMATIC WEIGHING INSTRUMENTS (NAWI)

Ho Chi Minh City, Vietnam
September 24 to 28, 2007
COUNTRY REPORT: PHILIPPINES

The Philippine Islands

THE PHILIPPINES stands at the crossroads of the developed western world and the Orient. It lies in the heart of Southeast Asia, stretching more than 1,840 kilometers. Composed of 7,107 islands, the Philippines is readily accessible to the different capitals of the world. Its three main islands are Luzon, Visayas and Mindanao. The South China Sea washes its western shores. Taiwan, China and Hong Kong are northern neighbors and further north is Japan. To the west lie Southeast Asian countries such as Singapore, Malaysia and Thailand. An arm of the archipelago reaches out onwards Borneo and at its feet stands the chain of Indonesian islands. To the east and south, the waters of the Pacific Ocean sweep its headlands, looking out towards Micronesia and Polynesia.

- MANILA is the capital city.
- Population – 84 million



1 - SELF INTRODUCTION

I am **Mr. ROLLY C. MEDIALDEA,** Science Research Specialist II working at the Mass, Force & Pressure Standards Section of the National Metrology Laboratory (NML) of the Industrial Technology Development Institute (ITDI) an agency under the Department of Science and Technology (DOST).

I have already spent 23 years in government service, 15 years of which in Metrology and doing most of my job at the Force & Pressure Laboratory.

Mass, Force & Pressure were merged into one section recently and I am also tasked to do calibration for Mass.

1.1 - EXPLAIN ABOUT YOUR ORGANIZATION AND DEPARTMENT

Brief History: ITDI

The Industrial Technology Development Institute (ITDI), a government organization under the Department of Science and Technology (DOST), is a multi-disciplinary research and technical service institute. It is mandated by virtue of Executive Order No. 128 to render variety of services to local industries. The Standards and Testing Division (STD) and the National Metrology Laboratory (NML), two major divisions are tasked to implement among others testing and calibration services. ITDI is mandated by Batas Pambansa Bilang 8 section 6 to establish and maintain the national standards for the SI units for quantities such as mass, length, temperature, electricity and luminous intensity and other derived units from them; and the Science Act of 1958, pertaining to the test and analyses of products and materials and the calibration of weights and measures. These standards are disseminated through calibration and/or verification services offered to industry, public as well as private organizations, academe and to the general public, etc.

National Metrology Laboratory

Major Services

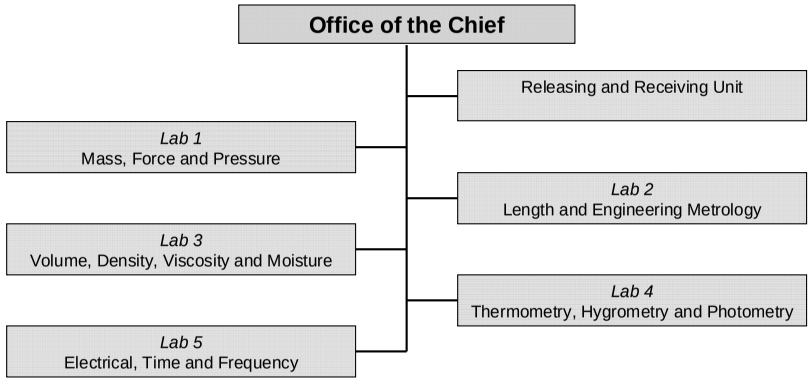
- Calibration, verification and measurement services
- Metrology (local) laboratories proficiency evaluation
- Metrology training including calibration/verification of test measuring instruments and uncertainty of measurements among others.

Mission

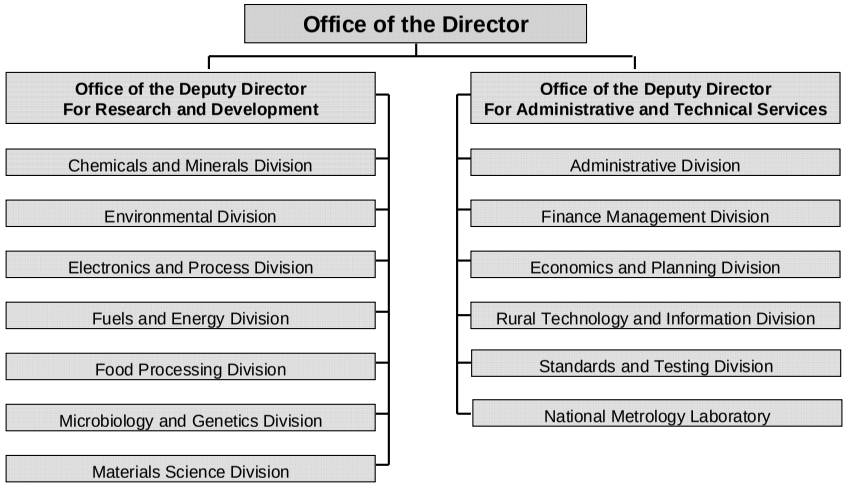
We shall establish and disseminate national standards of units and measurements to calibration laboratories and other sectors to provide international traceability to measurements done in the country. We shall do this by reliably conducting calibration and measurements at accuracy levels appropriate to the need of the clients. As national custodian for weights and measures, ITDI's program on metrology responds to the call for accuracy and traceability in the units of measurement (e.g. mass, length, volume) for product standardization, higher quality and competitiveness of local products, and protection of the consumers.

Organizational Structure of NML, and ITDI

NATIONAL METROLOGY LABORATORY
Organizational Chart



INDUSTRIAL TECHNOLOGY DEVELOPMENT INSTITUTE
Organizational Chart



1.2 - EXPLAIN YOUR PROFESSIONAL EXPERIENCE IN YOUR ORGANIZATION

My major task is on the calibration of testing machines done on-site throughout the country and all types of force instruments such as force gauges, push-pull scales, durometers, torque gauges, and other similar instruments.

Since the merger of Mass, Force & Pressure Laboratory, I was assigned to calibrate standard weights (OIML accuracy class F1 to M series) and weighing scales (OIML accuracy class III, IV).

2 - NON-AUTOMATIC WEIGHING INSTRUMENTS (NAWI) IN YOUR COUNTRY

2.1 - WHAT ARE THE MAJOR PURPOSES OR TARGETS TO USE NAWI?

The NAWI produced are intended for industrial and commercial and/or trading applications. For urban areas, the demand for digital balances are increasing, while for the rural areas, the people still stick to the traditional spring scales and other mechanical weighing instruments.

2.2 - HOW MANY MANUFACTURERS OF NAWI ARE THERE IN YOUR ECONOMY?

There are around 20 local manufacturers of NAWI in the country most of which are producing more on mechanical beam platform type and spring scales.

2.3 - IF YOU KNOW PLEASE MENTION APPROXIMATE TOTAL NUMBER OF PRODUCTION OF NAWI.

We don't have available production data but according to the producers they are producing more on mechanical beam platform type and spring scales. A considerable number of digital weighing instruments are being assembled locally. These are for commercial and industrial use.

2.4 - IF YOU KNOW, PLEASE MENTION APPROXIMATE RATIO (%) OF NUMBERS IN USED FOR THE (A) ELECTRONIC WEIGHING SCALES (B) MECHANICALSCALES USING A SPRING AND (C) MECHANICAL BALANCES USING A WEIGHT BEAM AND WEIGHTS.

The bulk of production is on mechanical spring scales which comprise about 70%, 20% for digital and 10% using a weight beam and weights.

2.5 - WHAT ARE THE ACCURACY CLASS AND THE MAXIMUM CAPACITY, WHICH ARE MOST COMMONLY USED?

OIML Accuracy Class I, II, III & IV. The capacities are from 1 mg to 200 g for Class I. 1 kg to 10 kg for Class II used mostly in quality control laboratories and 100 kg to 100 t for Class III used mostly in industrial/commercial areas and 2 to 100 kg Class IV for spring scales used mostly in ordinary wet markets.

3 - LEGAL METROLOGY SYSTEM IN YOUR ECONOMY

Under the new law, the National Metrology Board (NMB) which is composed of different departments will implement the legal metrology based on their mandated tasks.

For weighing machines, the NML is still doing the verification while at the same time giving training on verification of weights and weighing scales for local government unit inspectors and other sectors concerned with weights and measures e.g. DOST Regional Office technical personnel. The thrust of the NML is to train them first before the verification activities will be turned over to them.

3.1 - WHO IMPLEMENT THE MEASUREMENT LAW (government, metrology institute, verification body, testing laboratory, etc.)?

The National Metrology Board (NMB) is the national policy-making body concerning with metrology, calibration and/or verification and other metrological controls on test and measuring instruments. It is chaired by the Secretary of the Department of Science and Technology (DOST) to which the Industrial Technology Development Institute (ITDI) belongs.

The NMB is composed of representatives from different government departments as well as private organizations.

Under the new law ***Republic Act No. 9236*** better known as ***"The Metrology Act of 2003"*** the ITDI is tasked to establish and maintain the Philippine National Standards of Measures for five (5) of the base units and the units derived from them and to conduct higher accuracy calibration/verification services and other metrological controls, e.g. pattern/type approval of test and/or measuring instruments.

The different government departments will regulate activities under their control, such as;

- *Department of Interior Local Government (DILG)* – regulation on weights and measure use in local commerce and trade, e.g. verification/inspection of weighing scales used in local markets.
- *Department of Transportations and Communications (DOTC)* – regulation on use of taximeters, communications equipment and the like.
- *Department of Public Works and Highways (DPWH)* – regulation of constructions of buildings, roads, bridges and similar infrastructures.

3.2 - DESCRIBE BREIFLY THE TYPE OF WEIGHING INSTRUMENTS AND IT'S MEASURING RANGE WHICH ARE COVERED BY MEASUREMENT LAW.

The measurement law does not specify which range is covered. The requirement is, as long as the equipments/instruments are verified by accredited institution and the measurement standards are traceable to SI units as much as possible through NML/ITDI.

3.3 - ARE INITIAL VERIFICATION AND RE-VERIFICATION REQUIRED? IF YES, WHICH ORGANIZATION PERFORMS THE VERIFICATION? HOW LONG IS THE RE-VERIFICATION PERIOD? HOW MUCHVERIFICATION IS PERFORMED IN A YEAR?ARE THEY INCREASING OR DECREASING?

Initial verification is done by the manufacturer itself following the standards set for the certain instrument/equipment by the standard formulating body the Bureau of Products Standard or in the absence of a local documentary standard, those specified by international standards.

Re-verifications are normally set every year. NML-ITDI handles most of the job but with the dissemination program done by ITDI for several years through training, DOST Regional Offices, several accredited laboratories and Local Government Units (LGU) are starting to do some. In these programs the NML-ITDI has phased out calibration/verification of several low accuracy instruments and concentrated on higher-accuracy-level of instruments.

The number of verifications per year is increasing. More and more requests for trainings conducted by NML,ITDI are received from private companies, local government units and other sectors.

4 - EXPLAIN CURRENT SITUATION IN YOUR ECONOMY ABOUT THE COMPLIANCE TO THE INTERNATIONAL STANDARDS / RECOMMENDATION, SUCH AS OIML R76?

We adopt OIML R-76 and R-111 for verification of weighing instruments and standard weights respectively. We use a local (BPS) standard for spring scales.

5 - ARE THERE ANY REQUIREMENTS FROM YOUR ECONOMY? DO YOU HAVE ANY PROBLEM IN ORDER TO IMPLEMENT THE LEGAL METROLOGY SYSTEM (budget, human resources, etc.)?

As is always the case, budget is one of the main problems in implementing the legal metrology system. As a consequence there is always the problem of hiring technical personnel and the procurement of appropriate standards/equipments to perform inspection and verification of weighing instruments used in the industry, trade and commerce.


THE END
THANK YOU!!!

WMO Presentation

Weights and Measures Programme

Presented by :
Phang Long Hwa
Technical Executive
Weights and Measures Office
SPRING Singapore

Weights and Measures Programme

Policy

- **To ensure that a uniform and accurate system of weights and measures is used in Singapore for fair trade & correct measurement for excise tax computation**

Law

- **Governed by the Weights and Measures Act and Regulations**
- **SPRING administers the W&M Programme since 1 April 2000**
- **There are about 43,000 weighing and measuring instruments in Singapore**

5 Categories of Weighing and Measuring Instruments

The following are the regulated weighing and measuring instruments





(a) (b) (c) (d) (e)

(a) Instrument for measurement of liquor
(b) Flow meters
(c) Oil dispensing pumps
(d) Linear measures
(e) Non-automatic weighing instruments

WMO's Operations

The Current Approach

Pre-market Activities

- **Licensing manufacturers/repairers of weighing & measuring instruments for trade use**
- **Registering approved weighing & measuring instruments**
- **Verifying & stamping above instruments**

Post-market Activities

- **Inspecting above instruments for inaccuracies & tampering**
- **Investigating complaints on short weights & measures**

Verification Stamp

Tamper proof paper adhesive seal

Lead and wire seal

WMO's New Approach

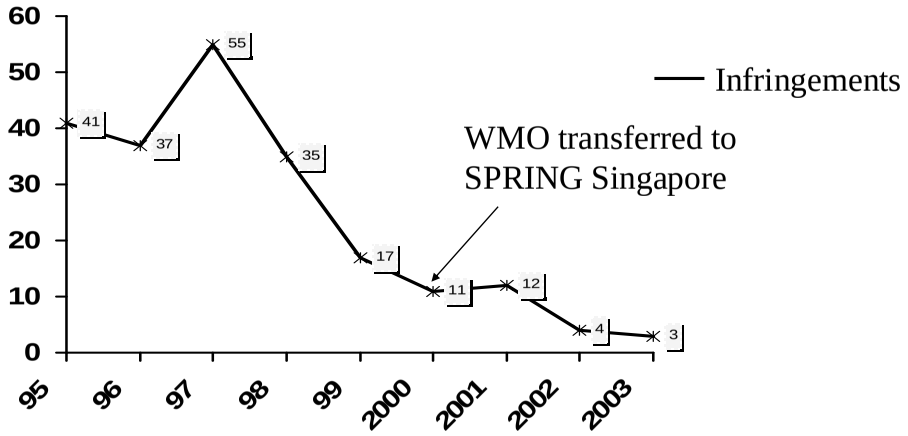
- Replace the mandatory Licensing Scheme with the voluntary Authorised Verifier Scheme
- Adopt the Average Quantity System
- Incorporate Maximum Permissible Errors based on OIML Recommendations
- Propose "verification fees" revision and "verification review fees"

WMO Posters & Advertisement

Accuracy Label

Introduced on 1 April 2004

Achievements



Number of WMO infringements for period FY95 to FY2003

Future Direction

(1) Implement the international practice of Average Quantity System (AQS) for pre-packed goods.

(2) Farm out verification works to designated Authorised Verifiers

(3) Develop new capabilities – verification of CNG, Hydrogen dispenser

(4) Continue to train Inspectors / Authorised Verifiers on relevant OIML Recommendations

Summary

(1) Pre and post–market control of the Weights and Measures Programme

(2) Proposed amendments to the weights and measures legislation

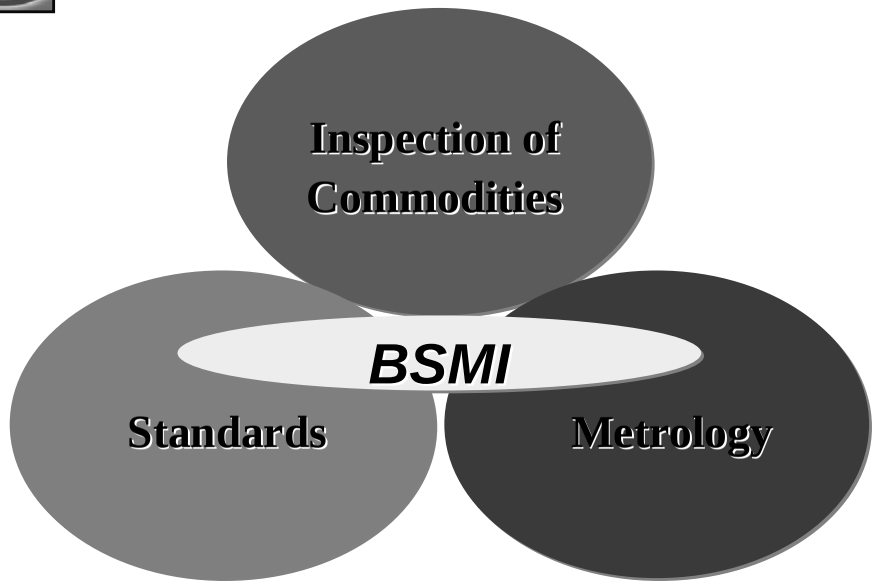
(3) Supplement the Weights and Measures Programme with annual publicity campaign

APEC/APLMF Training Courses in Legal Metrology
Train the Trainer Course on the Verification of Mechanical Weighing Scales

Current Situation of Legal Metrology System in Chinese Taipei

Presenter : Bo-Chang Su
Bureau of Standards, Metrology and Inspection.

1. Self Introduction



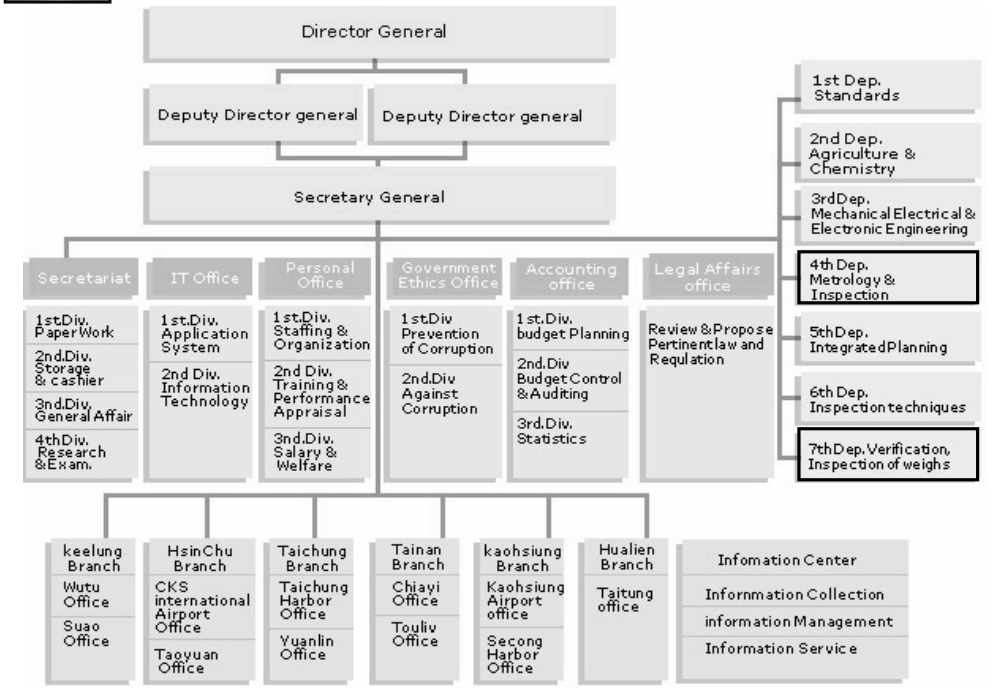
Services provided by the BSMI - 1

- Development and Promotion of National Standards
- CNS Mark Certification System
- Licensing and Management of Measuring Instruments Enterprises
- Type Approval of Measuring Instruments
- Verification and Inspection of Measuring Instruments
- Calibration Service of Measurement Standards
- Inspection of Commodities
- Contracted Inspection

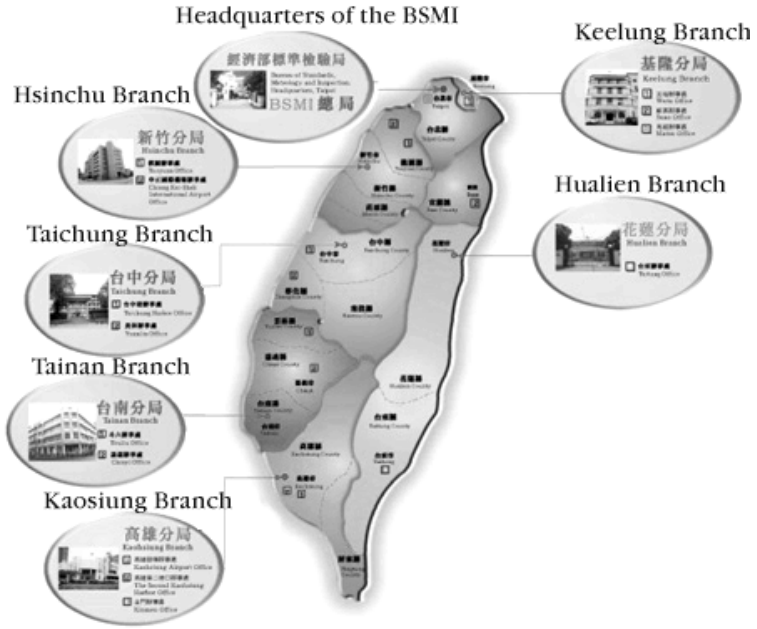
Services provided by the BSMI - 2

- Commissoned test and other technical services
- Voluntary Product Certification
- Inspection Conducted by Designated Laboratories
- Registration of Product Certification
- Management System Certification

Organizational Chart of BSMI



Map of BSMI Office Locations



2. Non Automatic Weighing Instruments in Chinese Taipei

Major purposes to use NAWI

- Ensure fair trade

Manufacturers of NAWI

Weighing Instrument Enterprises	Number
Manufacturers	111
Repairers	25

Approximate ratio (%)

- Electronic weighing scales
- Mechanical scales using a spring
- Mechanical balances using a weigh beam and weights

Most commonly used the class and the maximum capacity

Class	Type	maximum capacity
III	Electronic weighing scales	15 kg or 30 kg
IIII	Mechanical scales using a spring	7.5 kg

Type approval of weighing instruments

- Regulations Governing Type Approval of Measuring Instruments
- Electronic non-automatic weighing instruments:

with maximum capacity of not less than 1 kg and not more than 100 kg, and the number of verification scale interval 1000 ~ 10,000.

Verification of weighing instruments - 1

- Regulations Governing Verification and Inspection of Measuring Instruments
- Non-automatic weighing instruments and non-continuous accumulative automatic weighing instruments, **excluding** the following instruments:

(1)Non-pricing weighing instruments with a number of verification scale interval all more than 10,000

(2)Suspended weighing instruments with a maximum weighing capacity of more than 1 t

(3)Bathroom scales

(4)Weighing in motion non-automatic weighing instruments

Verification of weighing instruments - 2

- Except for some measuring instruments of which the verification is conducted by qualified organizations assessed by the BSMI, other instruments are verified and inspected by this Bureau and its six branches.
- Weighing instruments are verified and inspected by the 7th division and all branches of the BSMI.
- All instruments that pass verification will be attached with a conformity tag.

Initial verification of NAWI in Chinese Taipei

NAWI	Electronic Scale	Mechanical scale
2005	41,509	152,391
2006	20,948	170,696

Unit：Piece

3. Legal metrology system in Chinese Taipei

Implements the measurement law

- The Constitution of the Republic of China (Article 107) The Central Government shall have the power of legislation and administration over weights and measures matters.
- **The Weights and Measures Act** has been setup to regulate standards of weights and measures.it was promulgated in 1929, and was most recently updated in 2003.In Chinese Taipei, the authority for legal metrology is the **Bureau of Standards, Metrology and Inspection**（**BSMI**）.

Main activities concerning legal metrology

- Establishment, maintenance and dissemination of national measurement standards.
- Enforcement of using legal units of measurement.
- Management of measuring instruments enterprises
- Revision of laws and regulations for weights and measuring instruments.
- Type approval of legal measuring instruments
- Verification and inspection of legal measuring instruments.

Type approval of weights & measuring instruments

- The Ministry of Economic Affairs has currently announced that electronic scales, water meters, taximeters and diaphragm gas meters are subject to type approval.
- The BSMI to review the conformity of the appearance, structure and performance test results of sample instruments against relevant requirements. Once the type of an instrument has been approved, the BSMI issues a type approval certificate.




Designated laboratory for type approve of measuring instruments

Category	Laboratory
Electronic scales	Electronics Testing Center, Taiwan (ETC)
Taximeters	Electronics Testing Center, Taiwan (ETC)
Diaphragm gas meters	National Chang Kung University （NCKU）

Except for the water meter perform type approval tests by BSMI

Type approval tests had been performed 1998 to 2006

Type Approval	1988-2006
Taxi Meters	81
Electronic NAWI	159
Water Meters	91
Diaphragm gas meters	25
Total	356

Unit：Type

Verification and inspection of legal measuring instruments

Kinds of legal measuring instruments that must be verified

- Taxi Meter
- Weighing instrument
- Non-Invasive mechanical sphygmomanometer
- Volumeter
- Milk hydrometer
- Electricity meter
- Radar and laser speedometer
- Sound level meter
- Concentration meter (including the Breathe alcohol tester and analyzer, Rice moisture meter and Vehicle exhausts emissions analyzer)
- Illuminance meter
- Mercury clinical thermometer

Commissioned verification activities

Category	Commissioned Agency
Electricity Meters	TERTEC
Breathe Alcohol Testers and Analyzers	ETC, ITRI
Radar and laser Speedometers	ETC, ITRI
Sound Level Meters	ETC
Vehicle Exhausts Emissions Analyzers	ETC
Illuminance Meters	ETC
Rice Moisture Meters	ETC

- TERTEC: Taiwan Electric Research & Testing Center
- ETC: Electronics Testing Center, Taiwan
- ITRI: Industrial Technology Research Institute

Verification of legal measuring instruments

Year	Initial Verification	Subsequent Verification	In service Inspection
2002	2,231,881	892,849	85,534
2003	2,455,681	1,075,786	82,430
2004	2,435,072	1,077,494	87,278
2005	1,876,648	1,162,763	89,758
2006	1,745,824	980,560	88,104

Unit : Piece

4. Compliance to the International Standards

Compliance to the international standards

- In Chinese Taipei, the technical regulation of type approval for non-automatic weighing instruments are conforming to the OIML R 76.
- BSMI has been working towards harmonizing national technical requirements for weights and measuring instruments with international requirements.

5. Other Requirements in Chinese Taipei

Administration of weights and measures industry

- The Business Operation Licensing and Administration Regulations of Measuring Instrument Enterprises.
- Having recognized the impact on fair trade resulted from the use of weights and measuring instruments and the specific characteristics of the industry, the BSMI requires that an license be obtained for any person to be engaged in operating the business of manufacturing, repairing or importing measuring instruments so as to ensure adequate management.

one standard
one test
one certificate
accepted worldwide

Thank you for your time and attention

http://www.bsmi.gov.tw

The Verification of Mechanical Weighing Scales

Ms. Pattaraporn Surasit
CBWM, Thailand

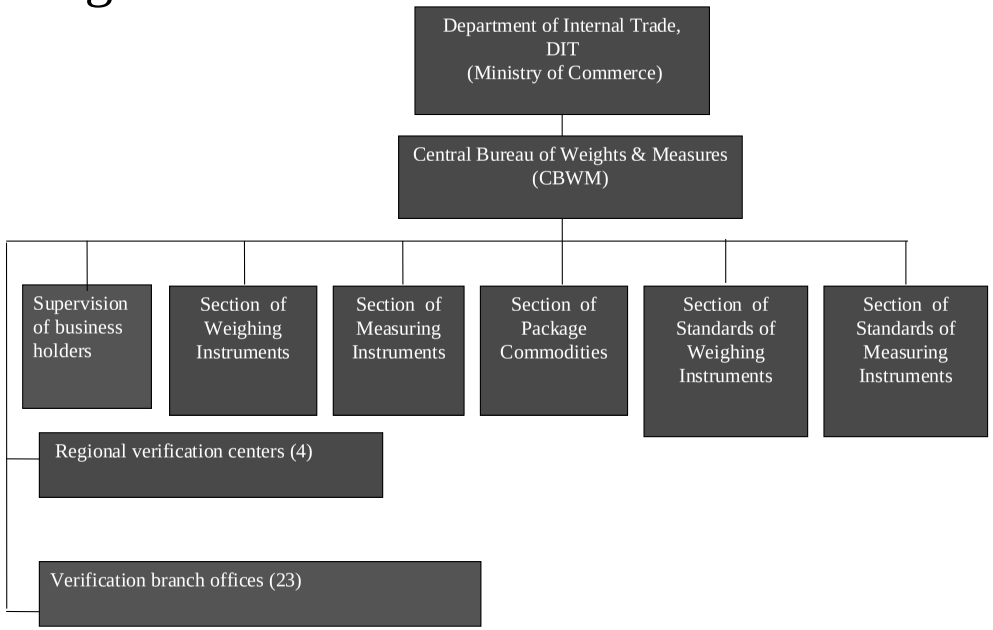
The Verification of Mechanical Weighing Scales

1. Introduction
2. Non Automatic Weighing Instruments (NAWI) in Thailand
3. Legal Metrology system in Thailand
4. Current situation in Thailand about compliance to the international
5. The requirements to implement the legal metrology system

1.Self Introduction

- In Thailand, The Central Bureau of Weights & Measures (CBWM) is the organization which management system on the legal metrology.
- The CBWM responsible for supervising manufacturers, importers, repairers, and sellers of weighing and measuring instruments including weighing or measuring service providers; the functions of the Bureau include establishing the standards of weighing and measuring instruments, providing verification services for weighing and measuring instruments, prescribing the displaying methods of net content of packaged goods, and inspecting the net content of packaged goods for the impartiality of the commodity transactions.

Organization Chart



1.Self Introduction

- I am responsible for maintaining of standards of legal metrology, prescribing qualification of such standard developing calibration methods including providing calibration service for its officers, business holders and users of weighing instrument.

1.Self Introduction

- improve the quality of spring scale employed in trading purpose to ensure that stability of the instruments.

2.NAWI in Thailand

- The major purposes/target to use NAWI

Cover by law

- To weigh products/goods for transaction.

Not cover by law

- To weigh the products for recheck the weights.
- To weigh objects for analysis.(In Laboratory)
- To weigh the raw material for industrial work.
- To weigh the vehicle.(limiting the vehicle weight of Department of Land Transport.
- etc,.

2.NAWI in Thailand

- Number of NAWI manufacturers:

~ 100 manufacturers.

- Number of production of NAWI is

~ 600,000 /year. Its consist of following;

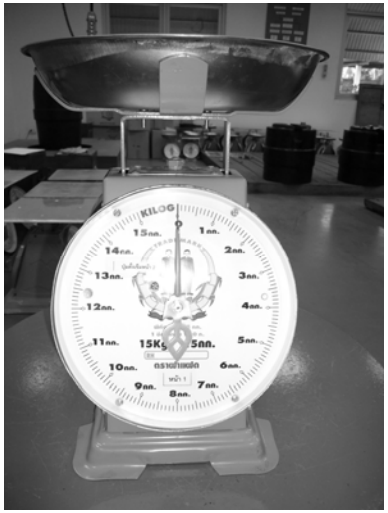
500,000 spring scale (around 80%) and

100,000 electronic weighing and mechanical balance using a weigh beam and weights (around 20%).

2.NAWI in Thailand

- The accuracy class and max. capacity which are most commonly used in Thailand.

-Spring Scale with 7kg and 15 kg is the most commonly used in Thailand. (no accuracy class for spring scale)



3.Legal metrology system in Thailand

3.1 Who implements the measurement law ?

The organization which implements the measurement law is Government (CBWM).

3.Legal metrology system in Thailand

•Process & system of verification & inspection work

3.Legal metrology system in Thailand

3.2 The type of weighing instruments and its measuring range, which are covered by measurement law.

- Weighing instruments are divided into 3 types as follows
  - Non-automatic weighing instruments.
  - Automatic weighing instruments.
  - Weights

3.Legal metrology system in Thailand

- The measuring range that cover by law:

  In Thailand,the measurement law concerning non automatic weighing instruments is followed by OIML R76. and there are not limit the measuring range in the measurement law except for the spring scales and weights. it is limited the range as follows:

  - Weights: the measuring range is 1 g- 50 kg. 
  - The spring scales: the measuring range and mpe as follows:

Cap. (Kg)	e (g)	Min	Range measurement (kg)	MPE int.Ver. (g)	MPE for Inser.(g)
3	10	100 g	0 - 0.5 kg	5	8
			> 0.5 kg	10	15
7	20	200 g	0 – 1 kg	10	15
			> 1 kg	20	30
15	100	500 g	0 – 2.5 kg	25	38
			> 2.5 kg	50	75
20	100	500 g	0 – 2.5 kg	25	38
			> 2.5 kg	50	75
35	100	1 kg	0 – 5 kg	50	75
			> 5 kg	100	150
60	200	2 kg	0 – 10 kg	100	150
			> 10 kg	200	300

3.Legal metrology system in Thailand

3.3 Initial verification and re-verification is done by CBWM.

Initial verification	re-verification
The weighing instruments which use for trade	Truck scale (2 year) 

3.Legal metrology system in Thailand

3.4 Type Approval:

No Type Approval.

4.Current situation in Thailand about compliance to the international

- Non-automatic Weighing Instruments are based on OIML R76
- Automatic Weighing Instruments are principally based on OIML R50, R51, and R107.
- Length-measuring Instruments are based on OIML R35.
- Automatic Level Gauges are based on OIML R85.
- Liquid-measuring Devices Gauges are based on OIML R117.
- Gas Volume Meters are based on OIML R6, R31, and R32.
- Direct Mass Flow Meters are based on OIML R105.

5. The requirements to implement the legal metrology system

- Human resources: now a day there are a lot of tasks under the legal metrology while number of officers who supervise that tasks is not enough.
- Budget: the government does not give important in legal metrology field so they don’t give money to employ the personnel.

Thank you

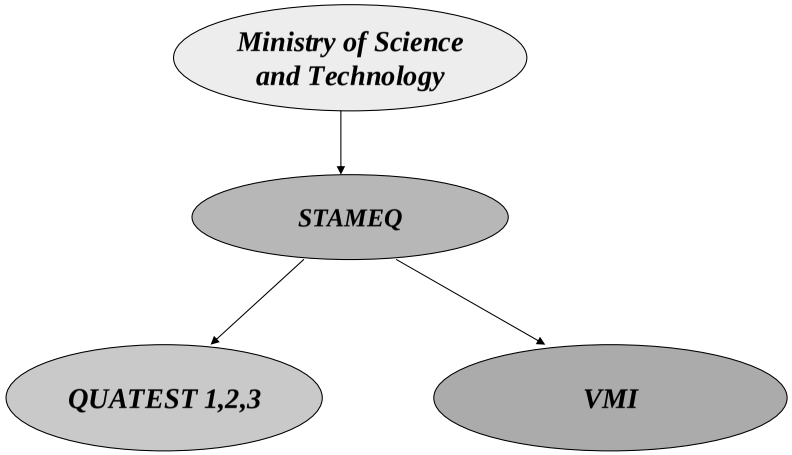
APLMF NON AUTOMATIC WEIGHING INSTRUMENT WORK SHOP PRESENTATION

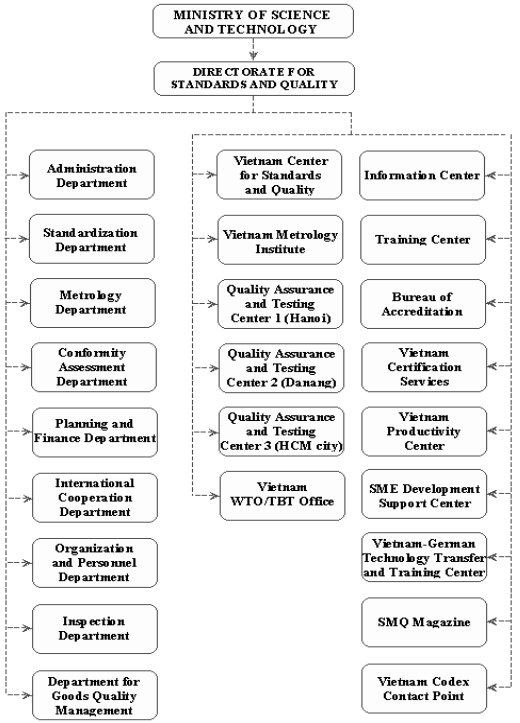
By: DO VIET HUNG
From: QUATEST3 - VIETNAM

ABOUT US

- **The Quality Assurance & Testing Centre 3** (in short QUATEST 3) is a Science-technological Organization under Directorate for Standards & Quality (STAMEQ) – Ministry of Science & Technology. The Centre had been established in 1975 by decision of the Chairman of State Committee of Science (now as Ministry of Science & Technology - MOST)

ORGANIZATION





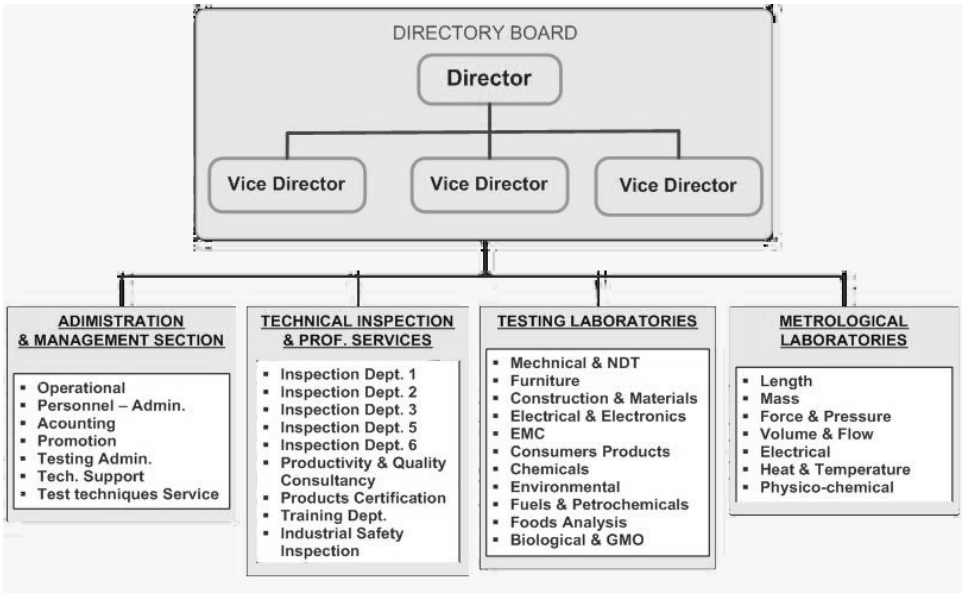
QUATEST3

- QUATEST3 is the biggest centre of STAMEQ
- QUATEST3 supplies services for testing and calibration/ verification.

LOCATION OF QUATEST 3

Head Office
(49 Pasteur St., Dist. 1, HCMC)

Metrology & Testing House



QUATEST3 LABORATORIES

- There are 11 testing laboratories and 7 measurement laboratories that each one has the different field of activities as above organization chart

Metrology

- Providing legal verification of measuring devices under range of designation;
- Providing calibration and verification services for measuring instruments, devices and system in field of length, mass, force, hardness, pressure, volume, flow-meters, electrical units, heat, physico - chemistry units…
- Carrying out research activities, manufacture and supply metrology standards and reference materials such like: mass reference weights in range of grading, volumetric reference vessels, water-meter test blench, pressure gauge test bench, analytical standard solutions …
- Providing maintenance, repairing and verification services for measuring and testing instruments/devices as well as related equipment systems.

NON – AUTOMATIC WEIGHING INSTRUMENT

- Non-automatic weighing instruments and weights are included in the list of verified measuring instruments
- QUATEST 3 Mass Measuring Laboratory (MML) is one of mass lab on legal metrology system of Vietnam. MML is accessed to accreditation for capability of calibration and verification by STAMEQ and Accreditation Body (VILAS).
- MML carries out the calibration and verification for non-automatic weighing instruments and weights.
- Person in charge of verification must be trained and got the license of verification from STAMEQ.
- There are about 10 people in charge of calibration and verification weighing instruments. We carry out the verification /calibration non – automatic weighing machines at site and in laboratory .

VERIFICATION FOR NON-AUTOMATIC WEIGHING INSTRUMENTS

- Verification is performed for non-automatic weighing instruments used in transaction purpose according to Ministry Science and Technology Decision number 13/2007/QĐ-BKHCN .

- Verification of weighing instruments and weights follows publication procedure issued by STAMEQ;

ĐLVN 02: 1988 Steelyards – Method and means of verification;
ĐLVN 13: 1988 Weighbridge – Method and means of verification;
ĐLVN 14: 1988 Platform scale – Method and means of verification
ĐLVN 15: 1988 Bench weight scale (Roberval & Beranger) – Method and means of verification;
ĐLVN 16: 1988 Non automatic weighing instrument of special & high accuracy class – Method and means of verification;
ĐLVN 30: 1988 Spring dial scale – Method and means of verification.

TEST FOR NON AUTOMATIC WEIGHING INSTRUMENTS

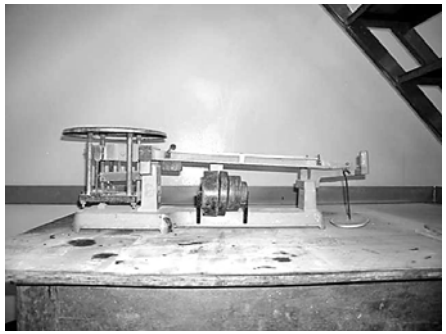
- 1) Repeatability test,
- 2) Discrimination / sensibility test,
- 3) Eccentricity test,
- 4) Weighing (load) test

MAXIMUM PERMISSIBLE ERRORS

- Base on OIML R76-1:1992 initial

MPE	Load m in verification scale interval e			
	Class (I)	Class (II)	Class (III)	Class (IIII)
± 0.5 e	0 ≤ m ≤ 50 000	0 ≤ m ≤ 5 000	0 ≤ m ≤ 500	0 ≤ m ≤ 50
± 1.0 e	50 000 < m ≤ 200 000	5 000 < m ≤ 20 000	500 < m ≤ 2 000	50 < m ≤ 200
± 1.5 e	200 000 ≤ m	20 000 < m ≤ 100 000	2 000 < m ≤ 10 000	200 < m ≤ 1 000






TRACEABILITY

1) Reference standard 1 kg, class E_1, calibrated by LNE, France
2) Weights and set of weights are compared to reference standard by MML
3) Environment condition of MML complies with OIML R111.

IMAGES OF MML


Reference standard 1 kg, class E_1

TRAINING COURSE FOR VERIFICATION

WEIGHING INSTRUMENTS IN TRANSACTION

INTRODUCTION OURSELVES

- We who are attending this APLMF training course work at QUATEST 3 (Quality Assurance and Testing Centre 3) which is belong to STAMEQ.
- Our work at QUATEST 3 in the field of mass measurement.

WEIGHING INSTRUMENTS

- 90% are electronic weighing instruments of all accuracy class which are manufactured from foreign countries such as USA, Japan, Switzerland, Korea, China, Germany... But most of weighbridges are assembled in Vietnam with load cell and indicator imported from foreign countries
- 10% are mechanical weighing instruments of class (III) and (IIII).Some of them are manufactured in foreign countries and most of them are made by domestic manufacturers especially platform scale and spring dial scale.

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- Testing House
  - No. 7, Road No. 1, Bien Hoa Industrial Zone 1, Dong Nai Province
  - Tel: (84-61) 383 6212 Fax: (84-61) 383 6298
  - E-mail: qt-kythuattn@quatest3.com.vn
- Representative Office in Middle Region
  - 104 Le Loi St., Quang Ngai City, Quang Ngai Province
  - Tel: (84-55) 836 487 Fax: (84-55) 836 489
  - E-mail: cn-quangngai@quatest3.com.vn

Thank you for your attention

Domo arigato gozaimasu