Asia-Pacific
Economic Cooperation

Asia-Pacific
Legal Metrology Forum

Handbook on Verification of Non-Automatic Weighing Instruments

APEC/APLMF Training Courses in Legal Metrology (CTI 10/2005T)

September 12-16, 2005
Jakarta, Indonesia

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February 2006

Train the Trainer Course on the Verification of Non-Automatic Weighing Instruments
September 12-16, 2005

Photos taken at the training course in Jakarta, Indonesia

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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 Non-Automatic Weighing Instruments’ that was held on September 12 - 16, 2005 at the Aryaduta Hotel in Jakarta, Indonesia. This training course was organized by the Asia-Pacific Legal Metrology Forum (APLMF) with a support fund of APEC-TILF (Trade and Investment Liberalization and Facilitation) program, CTI-10/2005T. The training course was also supported by (1) Directorate General of Domestic Trade, Ministry of Trade, Indonesia (2) National Metrology Institute of Japan (NMIJ), and (3) National Measurement Institute, Australia (NMIA). Having this result, I would like to extend my sincere gratitude to all the staffs of the Directorate General of Domestic Trade, two trainers from NMIJ and the Working Group on Training Coordination of APLMF chaired by NMIA. Also, special thanks should be extended to the APEC Secretariat for their voluntary supports.

We have kept making surveys among the APEC member economies concerning seminar and training programs in legal metrology to find their needs and also possible resources which would be available for the region. The survey shows that there is still a strong need for repeating training courses on weighing instruments that is one of the most traditional and essential category of instruments in legal metrology which is closely connected to daily life of every people. In addition, according to the globalization of international trade in worldwide, the compliance to international recommendations related to non-automatic weighing instruments (NAWI), which is represented by the OIML Recommendation R76, is getting an important issue for the APEC and APLMF member economies.

Main target of this training course was to assist the experts in charge of verification of NAWI in the APEC / APLMF member economies to learn deeply and to develop common understanding about the verification procedures based on the international standards and OIML recommendations. Thus the target would meet the APEC objective to harmonize metrology legislation within the OIML framework. The actual contents of the training course were focused on the understandings of basic principle and construction of non-automatic weighing instruments, international or national recommendations related to the weighing instruments, and learning of actual verification procedures through practices using real instruments.

In view of these situations, this training course concerning non-automatic weighing instruments had been planned and finished successfully so as to settle a sure basis of confidence in legal metrology related to the measurement of mass within the Asia-Pacific

region. I would like to say certainly that this is a valuable step to fruitful activities in legal metrology related to weighing instruments in the Asia-Pacific region.

I am really pleased to have this outcome from the training course and again deeply appreciate invaluable voluntary efforts of the APEC secretariat.

February 24, 2006

Dr. Akira Ooiwa
APLMF President

APEC/APLMF Seminars and Training Courses in Legal Metrology: Train the Trainer Course on the Verification of Non-Automatic Weighing Instruments

Weighing instruments is one of the most important categories of instruments in legal metrology. Because of the importance of the instruments, the WG (Working Group) of Training Coordination of APLMF chaired by Mrs. Marian Haire of Australia has given much effort to organize a lot of training courses so far. As one of such training courses, the Train the Trainer Course on the Verification of Non-Automatic Weighing Instruments was held from September 12th to 16th, 2005 at the Aryaduta Hotel in Jakarta, Indonesia.

This training course was organized by APEC and APLMF and supported by (1) Directorate of Metrology, Directorate General of Domestic Trade, Ministry of Industry and Trade of Indonesia, (2) National Metrology Institute of Japan (NMIJ), AIST, and (3) National Measurement Institute, Australia (NMIA).

According to the globalization of international trade in worldwide, the compliance to international recommendations related to non-automatic weighing instruments (NAWI) which is represented by the OIML R76 is getting an important issue for the APLMF member economies. This training course was planned in order to provide the experts in charge of verification of NAWI in the member economies an opportunity to learn in depth about the testing and verification procedures based on the R76.

Initially, this course was planned by the WG of Training Coordination of APLMF, and two trainers were supposed to be invited from Australia. However during the preparation for the course, it had become difficult for them to attend the course. Then, Mr. Kazuo Neda and Mr. Tsutomu Horikoshi of NMIJ were determined to serve as the trainers for the present training course on behalf of the Australian trainers.

A total of 23 trainees attended the course from the following 13 economies: Cambodia, People's Republic of China, Indonesia, DPR Korea, Lao PDR, Malaysia, Mongolia, Papua New Guinea, Peru, Philippines, Chinese Taipei, Thailand and Viet Nam. In addition, a lot of staffs from the Directorate of Metrology supported the course. The most of the participants from outside of Indonesia were supported of travel fees by APEC or NMIJ. The host economy and APLMF provided the venue, transportations and meals.

On Monday 12th September, the training course started with the opening ceremony in a separate room. Mr. Ardiansyah Parman, Director General, Directorate General of Domestic Trade, Ministry of Industry and Trade gave an opening address, which welcomed all participants to Indonesia and encouraged them to be concentrated in learning. After his address, the APLMF executive secretary gave an opening address. After the opening ceremony, each economy delivered a short presentation about the current situation on the verification of NAWI in their economy. Then, Dr. Matsumoto started off the lectures on measurement systems in Japan & Australia and basic understandings of NAWI using the text books and slides provided by NMIA. In the evening, the host provided a welcome dinner at the restaurant Bebek Bali in Jakarta.

On Tuesday 13th, Mr. Neda and Mr. Horikoshi gave lectures on general understanding of the OIML R76 and test methods based on this recommendation. The lecture was continued to Wednesday by adding practical exercises in separate groups using eight brand new electrical instruments provided by a local supplier of weighing instruments and eight sets of weights prepared by the Directorate of Metrology. All trainees learned very hard during these lectures. Sometimes they forgot to have lunch even after the lecture was finished in order to give a lot of questions to the trainers.

On Thursday 15th, all participants left the hotel in the morning with a bus prepared by the host and visited a manufacturer of mechanical balances, PT. Altraman located in suburb of Jakarta. After the visit, they visited the Indonesia Sea World and Ancol Art Shop in Jakarta.

On Friday 16th, the trainees demonstrated on each test methods in separated groups with the instructions by the trainers. The selected subjects of the demonstrations were: (1) multi interval and multiple range, (2) tare weighing performance, (3) weighing performance, (4) discrimination, (5) repeatability, (6) eccentricity, (7) zero-setting accuracy, and (8) learning activity. After the demonstrations, the closing ceremony was held, and all attended 23 trainees were certified by the trainers. In the evening, APLMF provided a farewell dinner at the restaurant Mayang Sari in Jakarta. This dinner was also attended by the delegates and assistant staffs of the host economy. 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 at the APLMF member's website.

At the end of this report, as the APLMF secretariat, we would like to give our sincere and deepest acknowledgement to the hard work and dedication by the staffs of the host economy represented by Mr. Ardiansyah Parman, Mr. Amir Saharuddin Sjahrial, Mr. Hari Prawoko and Mr. Herosobroto. We also deeply appreciate Mrs. Haire as well as NMIA for their organization in preparation for the course and for supplying informative text books and attractive slides. And of course, we can never forget the great efforts by the two trainers Mr. Neda and Mr. Horikoshi who provided well organized lectures with dedicated instructions and kind care for all trainees.

Dr. Tsuyoshi Matsumoto
APLMF Executive Secretary

Asia-Pacific
Economic Cooperation

Asia–Pacific
Legal Metrology Forum

APEC/APLMF Seminars and Training Courses in Legal Metrology

(CTI-10/2005T)

Train the Trainer Course on the Verification of

Non-Automatic Weighing Instruments

12 - 16 September, 2005

Aryaduta Hotel in Jakarta, Indonesia

Organizers:

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

Supporting Organizations:

- Directorate of Metrology, Directorate General of Domestic Trade, Ministry of Industry & Trade
- National Metrology Institute of Japan (NMIJ), National Institute of Advanced Industrial Science and Technology (AIST)
- National Measurement Institute, Australia

Venue and Accommodation:

- **Aryaduta Hotel**
  Jalan Prapatan 44-48, Jakarta 10110, Indonesia
  Phone: 62-21-23521234
  Fax: 62-21-23518647 (reservation), 62-21- 23518646 (marketing)
  E-mail: jktaj.reservation@hyattintl.com
  Website: www.jakarta.aryaduta.hyatt.com
- **Accommodations** will be prepared in this hotel on a request from the participant at a rate of **US$65+21% = US$79/day**. Please use the separated registration form to reserve the accommodations.
- **Roundtrip transportation** by taxi between the Jakarta International Airport (Cengkareng) and the Aryaduta hotel would be prepared on a request from the participant at the rate of **US$14** (140.000 Rupiah). Staffs of the host will be waiting at the **Information Desk** in front of the arrival gate. They will bring a placard with the names of the participants. The taxi fee will be charged to the room billing of the participants.

Trainers:

- Mr. Kazuo Neda, NMIJ, AIST, Japan
- Dr. Tsuyoshi Matsumoto, NMIJ, AIST, Japan
- Mr. Tsutomu Horikoshi, NMIJ, AIST, Japan

Registration:

- Fill the attached "**Registration Form**" and send it to the APLMF secretariat by **August 15, 2005**.

Visa Assistance:

- If you need visa to enter Indonesia, fill the attached "**Visa Assistance Form**" and send it to the host in Indonesia by **August 15, 2005**. They will provide an invitation letter.

Contact Persons of the Training Course:

- **APLMF Secretariat** (lecture, registration and funding)
  Dr. Tsuyoshi Matsumoto

  APLMF Executive Secretary
  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

- **Host in Indonesia** (visa assistance, accommodation, venue and access information)
  Mr. Hari Prawoko
  Mr. Herosobroto

  Directorate of Metrology, Directorate General of Domestic Trade, Ministry of Industry & Trade
  JL Pasteur 27, Bandung 40171, Indonesia

  Tel: +62-22-420-7066/2773
  Fax: +62-22-420-7035
  E-mail: prawoko@bdg.centrin.net.id

Program

12 September, Monday

9:00 - 9:30	Opening ceremony: Welcome Address by Mr. Ardiansyah Parman, Director General, Directorate General of Domestic Trade, Ministry of Industry and Trade. Opening Address by Executive Secretary of APLMF.
9:30 - 10:00	*Coffee Break*
10:00 - 12:00	Introduction: Participants provide brief overview of the measurement system on non-automatic weighing instruments in their economy (chaired by T. Matsumoto).
12:00 - 13:30	*Lunch*
13:30 - 15:00	Continue the introduction.
15:00 - 15:30	*Coffee Break*
15:30 - 17:00	Measurement system in Japan and Australia. Basic understandings of non-automatic weighing instruments and the construction of the instruments (by T. Matsumoto).
18:00 -20:00	*Welcome Dinner invited by the Host at the Bebek Bali (Resto-Cafe-Gallery), Gedung Ria Pembangunan Floor 3rd, Jl. Gerbang Pemuda Komplek Taman Ria Senayan, Jakarta.*

13 September, Tuesday

9:00 - 10:30	General understanding of the OIML R76: accuracy class, multi interval and multiple range, zero-tracking device, zero-setting device and weighing performance test (by K. Neda & T. Horikoshi).
10:30 - 11:00	*Coffee Break*
11:00 - 12:00	Continue the lecture
12:00 - 14:00	*Lunch*
14:00 - 15:00	Test methods on weighing instruments based on the OIML R76 including demonstration by the trainers: weighing performance test, zero-setting, tare-setting, eccentricity error, discrimination error, repeatability and tare weighing performance test (by K. Neda & T. Horikoshi).
15:00 - 15:30	*Coffee break*
15:30 - 17:00	Continue the lecture

14 September, Wednesday

9:00 - 10:00	Continue the lecture on the last day
10:00 - 10:30	*Coffee break*
10:30 - 12:00	Continue the lecture
12:00 - 14:00	*Lunch*
14:00 - 15:00	Exercise and explanation for the OIML R76 (by K. Neda & T. Horikoshi)
15:00 - 15:30	*Coffee break*
15:30 - 17:00	Simplified test methods on weighing instruments based on the OIML R76 (by K. Neda & T. Horikoshi)

15 September, Thursday (Technical Tour)

8:30	Leave the hotel by bus
10:00-11:30	Visit to a scale manufacturer, PT. Altraman in Jakarta
12:30-16:00	Visit the Indonesia Sea World and Ancol Art Shop. Participants could see many kinds of fish and other thing from Indonesia Ocean, and they could buy handy craft and souvenir from Indonesian Culture.
18:00	Back to the hotel by bus.

16 September, Friday

9:00 - 10:00	Preparation of demonstration on each test methods by the trainees in separated groups (instructed by K. Neda, T. Horikoshi & T. Matsumoto)
10:00 - 10:30	*Coffee break*
10:30 - 12:00	Demonstration on each test methods performed by the trainees in separated groups (instructed by K. Neda, T. Horikoshi & T. Matsumoto)
12:30 - 14:00	*Lunch*
14:00 - 15:30	*Continue the demonstration*
15:30 - 16:00	*Coffee break*
16:00 - 16:30	Closing ceremony and presentation of certificates
18:00 - 20:00	*Farewell dinner invited by APLMF at the Restaurant Mayang Sari, JL. Bulevar Kelapa Gading Block KGC, Jakarta 14240.*

Participants List of APEC/APLMF Train the Trainer Course on the Verification of Non-Automatic Weighing Instruments

September 12-16, 2005, Jakarta, Indonesia

Economy	Category	Name	Organization
Cambodia	Trainee	**Mr. Sok Narith**	Department of Metrology, Ministry of Industry, Mines and Energy
China, PR	Trainee	**Ms. Xue Liang**	National Institute of Measurement and Testing Technology
Indonesia	**Host**	**Mr. Hendro Purnomo**	Directorate of Metrology, Directorate General of Domestic Trade, Ministry of Industry & Trade
Indonesia	**Host**	**Mr. Heri Herdiana**	Directorate of Metrology, Directorate General of Domestic Trade, Ministry of Industry & Trade
Indonesia	**Host**	**Mr. Herosobroto**	Directorate of Metrology, Directorate General of Domestic Trade, Ministry of Industry & Trade
Indonesia	**Host**	**Mr. Lukman**	
Indonesia	**Host**	**Mr. Hari Prawoko**	Directorate of Metrology, Directorate General of Domestic Trade, Ministry of Industry & Trade
Indonesia	Trainee	**Mr. Arief Budiman**	
Indonesia	Trainee	**Mr. Dasman**	Metrology Institute, Industrie and Trade, Office of North Smatera
Indonesia	Trainee	**Mr. M. Eqbal**	Regional of Industry and Technol of Central Java, Indonesia
Indonesia	Trainee	**Mr. Ake Erwan**	
Indonesia	Trainee	**Mr. Ismail**	
Indonesia	Trainee	**Mr. Widyo Laksono**	
Indonesia	Trainee	**Ms. Oki Sriswastini**	
Indonesia	Trainee	**Mr. Gian Subagus**	

Indonesia	Trainee	**Mr. Sudaryono**	
Indonesia	Trainee	**Ms. Barnetje. A. W.**	
Japan	**Assitant trainer**	**Mr. Tsutomu Horikoshi**	Legal Metrology Division, National Metrology Institute of Japan, AIST
Japan	**Trainer / APLMF**	**Dr. Tsuyoshi Matsumoto**	Executive Secretary of APLMF / National Metrology Institute of Japan, AIST
Japan	**Trainer**	**Mr. Kazuo Neda**	Mechanical Metrology Division, National Metrology Institute of Japan, AIST
DPR. Korea	Trainee	**Mr. Pak Jin**	Central Institute of Metrology (CIM), State Administration for Quality Management (SAQM)
DPR. Korea	Trainee	**Mr. Ri Song Chul**	Central Institute of Metrology (CIM), State Administration for Quality Management (SAQM)
Lao. PDR	Trainee	**Mr. Sisomphet Nhoybouakong**	Science Technology and Environment Agency, Department of Intellectual Property Standardization and Metrology
Malaysia	Trainee	**Mr. Rosley Bin Abdullah**	Enforcement Division, Ministry of Domestic Trade and Consumer Affairs, Malaysia
Mongolia	Trainee	**Ms. Domon Sandag**	Mongolian Agency For Standardization And Metrology
Papua New Guinea	Trainee	**Mr. Victor Vaporoketo Gabi**	Papua New Guinea National Institute of Standards and Industrial Technology (NISIT)
Peru	Trainee	**Mr. Leonardo De La Cruz Garcia**	National Institute for the Defense of Competition and Protection of Intellectual Property (INDECOPI)
Philippines	Trainee	**Mr. Gregorio B. Mendoza**	Industrial Technology Development Institute
Chinese Taipei	Trainee	**Mr. Chun-Der Hsia**	Bureau of Standards, Metrology and Inspection (BSMI), Ministry of Economic Affairs
Thailand	Trainee	**Mr. Jarun Sangthong**	Central Bureau of Weigts and Measures, CBWM
Viet Nam	Trainee	**Mr. Duong Xuan Thien**	Vietnam Metrology Institute-VMI, Directorate for Standards and Quality

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

Overview of Measurement Law and Metrology Policy in Japan

September, 2005

Metrology Management Center
National Metrology Institute of Japan (NMIJ)

CONTENS

- Introduction on Measurement Law
- Legal Measuring Instruments subject to verification (18 types)
- Verification and Inspection system
- Verification organizations for implementation
- Type approval system and designated manufacturer system
- Video about Legal Metrology in Japan

Introduction on Measurement Law

- Legal Metrology system in Japan is administrated by the **Measurement Law**, related Cabinet order and Ministerial ordinance.
- The purpose of the Law is to develop the economy by establishing the **standards of measurement** and realizing **accurate measurement**. (Article 1)
- The Law was established in **1951** and fully amended in **1992** (current Law) in order to correspond new social needs, such as internationalization and deregulation.

Introduction on Measurement Law

- Main Concept
  - Any person who measures the quantity in **transaction** or **certification** with legal units shall measure it **accurately**. (Article 10)
  - Prohibition against the use of **non-legal measuring units** for transaction or certification.
  - Specifies measuring instruments for legal control.
  - Specifies Initial verification, re-verification and periodic inspection.

Legal Measuring Instruments subject to verification (18 types) -1-

- Taximeters *****
- Weights, **non-automatic weighting instruments ***
- Thermometers *****(glass thermometer)
- Clinical thermometers (glass type, resistance type) *****
- Leather-area measuring instruments *****
- Water meters, hot-water meters, fuel-dispensers, gas meters, LPG-dispensers, etc. *****
- Pressure gauges *****(Aneroid manometers, Aneroid sphygmomanometers)
- Flow meters ***** (exhaust-gas, drainage)
- Heatmeters *****

Legal Measuring Instruments subject to verification(18 types) -2-

- Maximum-demand power meters #
- Watt-hour meters #
- Reactive watt-hour meters #
- Illuminometers #
- Sound level meters *
- Vibration level meters *
- Density meters * (instruments for measuring concentration)
- Float-type hydrometers * (Relative density hydrometers)

Note: Type approvals for the instruments marked with * are granted by NMIJ/AIST and with # by JEMIC (Japan Electric Meters Inspection Corporation).

Non-automatic weighting instruments

- Scope
  - Verification scale interval **e ≥ 10 mg**
  - Number of verification scale interval **n ≥ 100**
- Certificates

	2002	2003	2004	2005
Japanese TAC (Type Approval Certificate)	14	14	9	4
OIML Certificate (in Japan)	0	1	2	1
Total (in Japan)	14	15	11	5
OIML Certificates (R60&R76)	93	133	110	130

Sep. 8, 2005

Verification organizations for implementation

National Measurement Institute of Japan (NMIJ/AIST)	: 60 staffs
Local Governments (47)	: Almost measuring instruments : 15,000 staffs
Japan Electric Meters Inspection Corporation (JEMIC)	: Mainly electric meters : 600 staffs
Designated verification bodies Japan Quality Assurance Organization (JQA) Japan Gas Appliances Inspection Association (JIA)	: Mainly environmental meters : 400 staffs

Verification and Inspection system

Initial Verification (Local Governments)

Re-verification
Local Governments (47)

- Taxi meters (1 yr)
- Water meters (8 yrs)
- Hot water meters (8 yrs)
- Fuel-dispensers (7 yr)
- Heat meters (8 yrs)
- Illuminometers (2 yrs)
- Sound level meters (5 yrs)
- etc.

Periodic inspection
Local Governments (47)
& Special Cities (102)

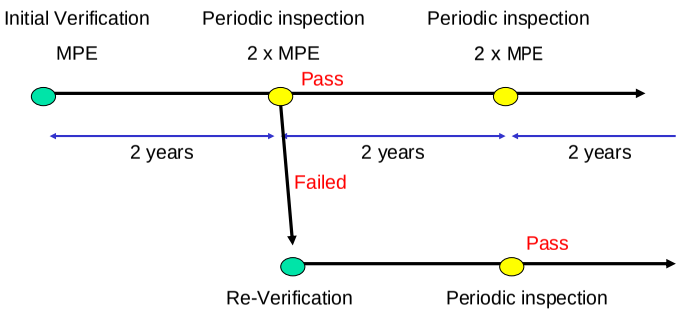
- **Weighting instruments (every 2 years)**
- Leather-area measuring machines (every year)

Initial only

- Hydrometers
- Glass clinical thermometer
- Aneroid sphygmo-manometers

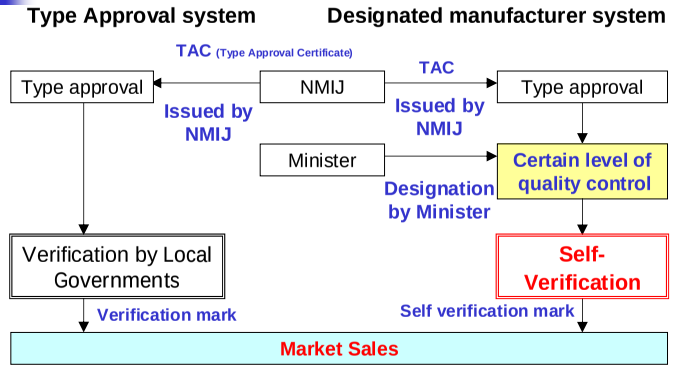
National Metrology Institute of Japan

Non-automatic weighting instruments



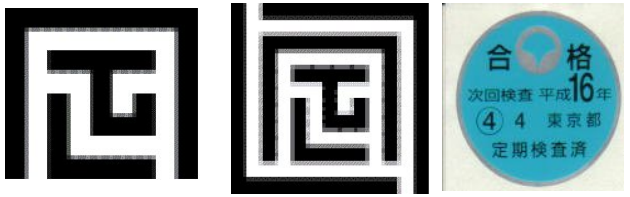
National Metrology Institute of Japan

Type approval system and Designated manufacturer system



National Metrology Institute of Japan

Verification and inspection marks



Verification mark

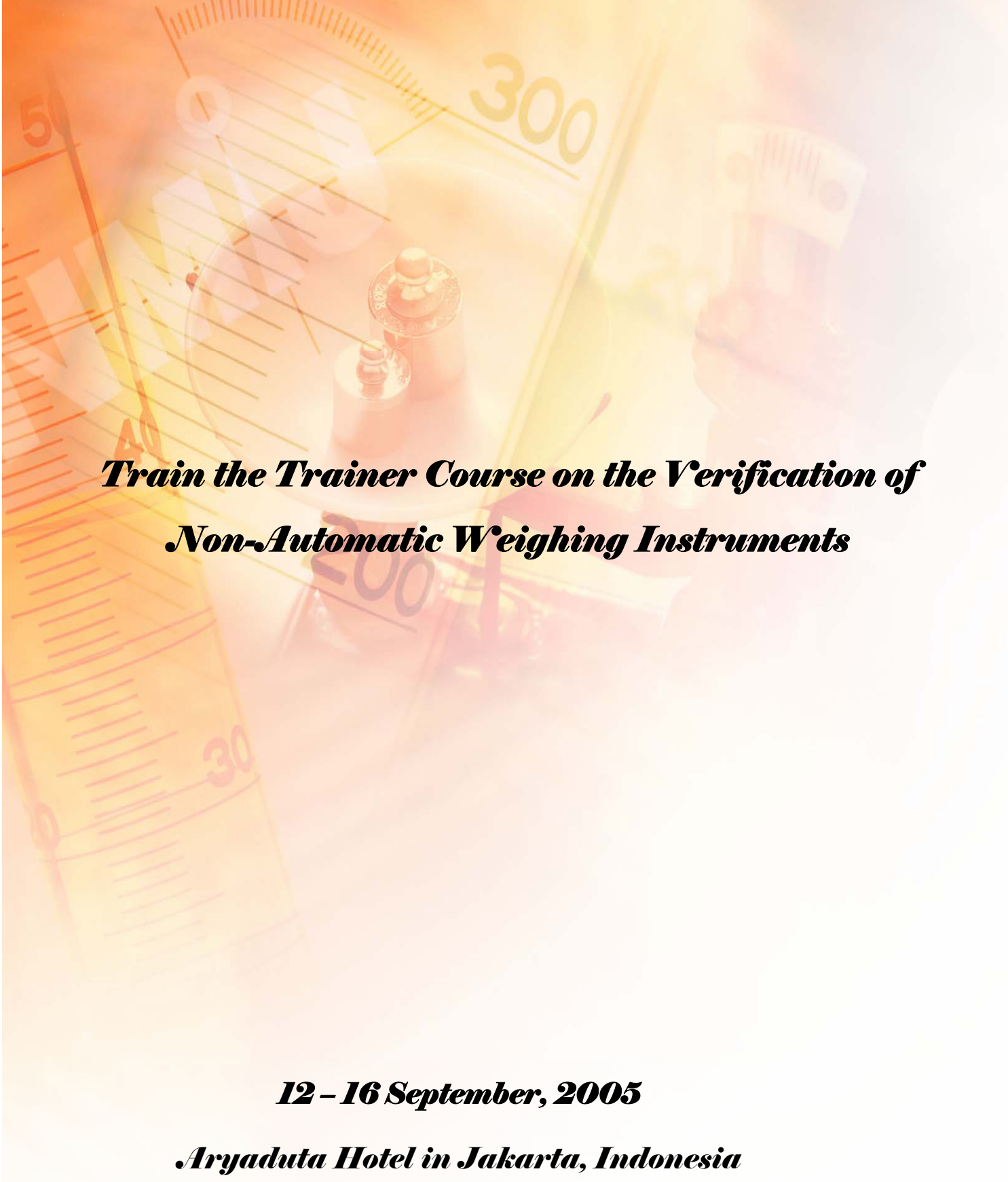
Self-Verification mark

Periodic inspection mark

National Metrology Institute of Japan

Thank you very much for your kind attention.

National Metrology Institute of Japan



Train the Trainer Course on the Verification of Non-Automatic Weighing Instruments

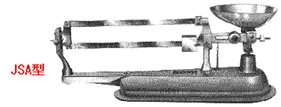
12 – 16 September, 2005

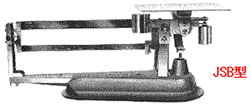
Aryaduta Hotel in Jakarta, Indonesia

National Metrology Institute of Japan AIST

AIST

Various NAWIs -1





AIST

Various NAWIs -2

AIST

Requirement for OIML R76

1. Metrological requirements
2. Technical requirements
3. Administrative requirements

AIST

Metrological requirements

Test under normal ambient conditions:

1. Zero-setting range and accuracy
2. Weighing performance test
3. Tare
4. Eccentricity
5. Discrimination
6. Sensitivity
7. Repeatability
8. Creep
9. Zero return
10. Stability of equilibrium

AIST

Metrological requirements

Tests under influence factors:

1. Tilting
2. Warm-up test
3. Weighing performance at static temperature
4. Damp heat,steady state
5. Voltage variations

AIST

Metrological requirements

Tests under disturbances (EMI/EMC):

1. Short power reductions
2. Electrical bursts
3. Electrostatic discharge
4. Immunity to radiated electromagnetic fields

AIST

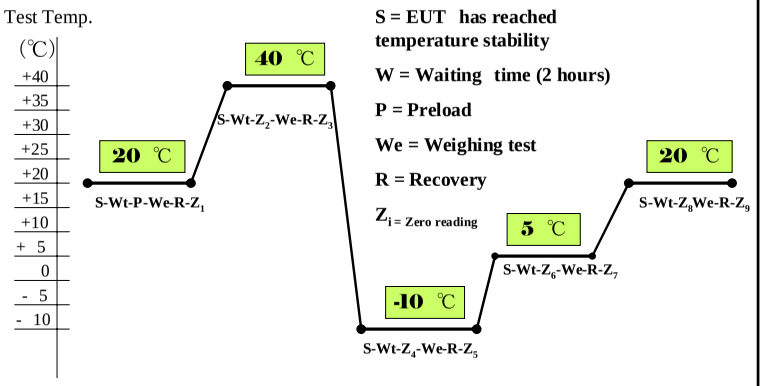
Metrological requirements

Tests with regard to long-term stability:

1. Span stability test
2. Endurance test

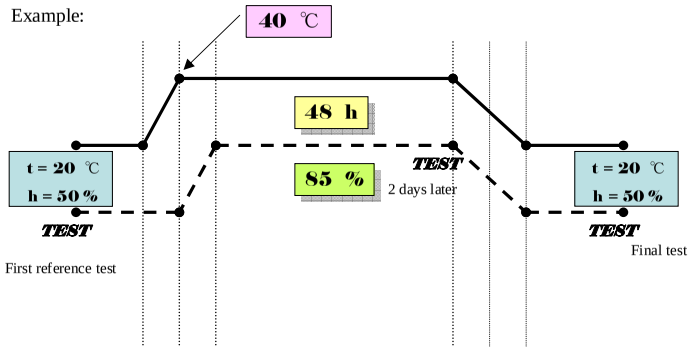
AIST

Metrological requirements
(Static temperature test)



AIST

Metrological requirements
(Test sequence for damp heat, steady state)



AIST

Accuracy classes for NAWI's

1. Class I 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

AIST

Accuracy classes for NAWI's

Accuracy class	Verification scale interval e	Number n=Max/e n ≧	Number n=Max/e n ≦	Minimum Capacity Min ≧
(I)	0.001 g ≦ e	50,000		100e
(II)	0.001g ≦ e ≦ 0.05 g	100	100,000	20e
	0.1 g ≦ e	5000	100,000	50e
(III)	0.1g ≦ e ≦ 2g	100	10,000	20e
	5g≦ e	500	10,000	20e
(IIII)	5g ≦ e	100	1,000	100e

AIST

Classification of instruments
(Table 3)

Maximum permissible errors on initial verification	for load mexpressd in verification scale interval e			
	Class 1 (I)	Class 2 (II)	Class 3 (III)	Class 4 (IIII)
±0.5e	0≦ m ≦ 50000	0≦ m ≦ 5,000	0≦ m ≦ 500	0≦ m ≦ 50
±1.0e	50000 < m ≦ 200000	5,000 < m ≦ 20000	500 < m ≦ 2000	50 < m ≦ 200
±1.5e	200000 < m	20000 < m ≦ 100000	2000 < m ≦ 10000	200 < m ≦ 1,000

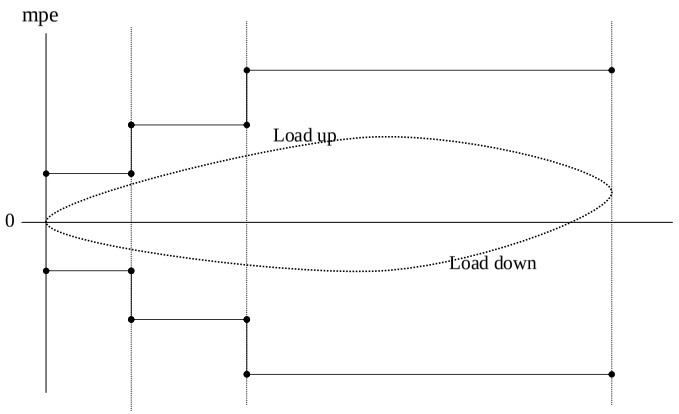
AIST

Multi-interval

- instruments have <u>one</u> weighing range,
- divided into partial weighing ranges by the manufacture
- each partial weighing range with different e determined by the manufacture
- Which partial weighing range is determined automatically both on increasing and decreasing load

AIST

Multi-interval



AIST

Multi-interval:requirements

- e_i and n_i shall comply with table 3
- the range shall comply with table 4

with the exception of the highest partial weighing range

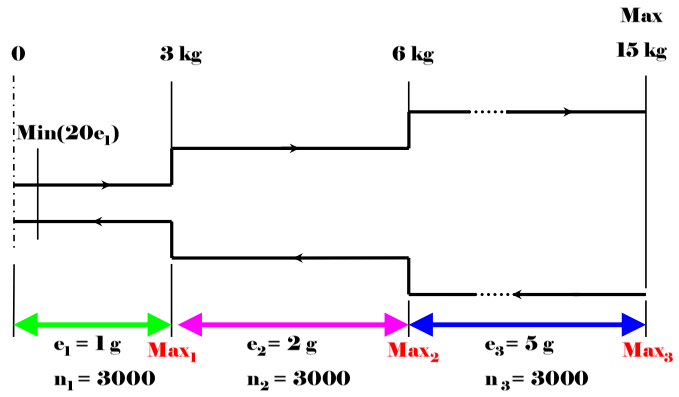
AIST

Maximum capacity of partial weighing ranges (Table 4)

Class	Ⅰ	Ⅱ	Ⅲ	ⅢⅠ
Max_i/e_{i+1}	> 50 000	> 5 000	> 500	> 50

AIST

Multi-interval



AIST

Multi-interval

- If load > 3000g,instrument automatically change to e_2=2g
- If load is removed to under 3000g, instrument automatically change to e_1=1g
- If load > 6000g, instrument automatically change to e_3=5g
- If load is removed to under 6000g, instrument automatically change to e_3=5g

AIST

Multi-interval;example

- e_1=1g and Max_1 = 3000g,than n_1 =3000
- e_2=2g and Max_2 = 6000g,than n_2 = 3000
- e_3=5g and Max_3 = 15000g,than n_3 =3000

AIST

Multi-interval:consequences

- Requirement apply to the net load for each possible value of tare
- For influence factors e is to be taken according to the load applied,

  at or near zero load e = e_1

AIST

Multi-range

- Instrument has <u>two or more</u> weighing ranges,
  - with different Max
  - different e
  - each range extending from zero to Max;

AIST

Multi-range:requirements

- e_i and n_i shall comply with table 3
- Requirement apply to next load for each possible value of tare
- For influence factors e is to be taken according to the load applied,
  - at or near zero load e = e_i

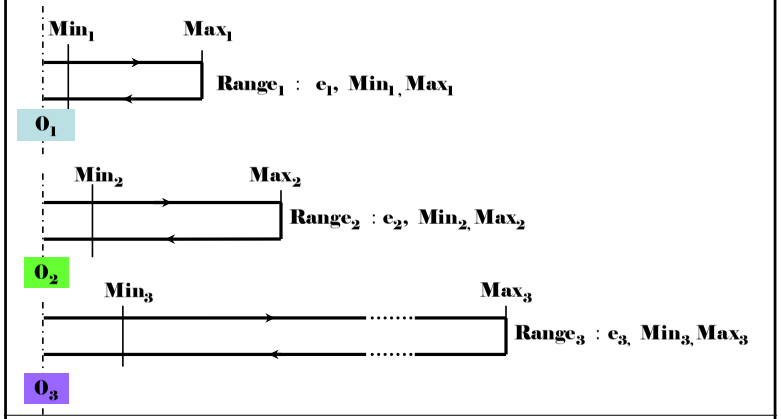
AIST

Multi-range

- The weighing range which is operation should be clearly indicated
- Manual selection is allowed from a smaller to a greater weighing range
- From a greater to a smaller weighing range when there is no load on the load receptor
  - and indication is zero or negative net value
  - tare operations is cancelled
  - and zero is set within 0.25 e_1

AIST

Multiple-range



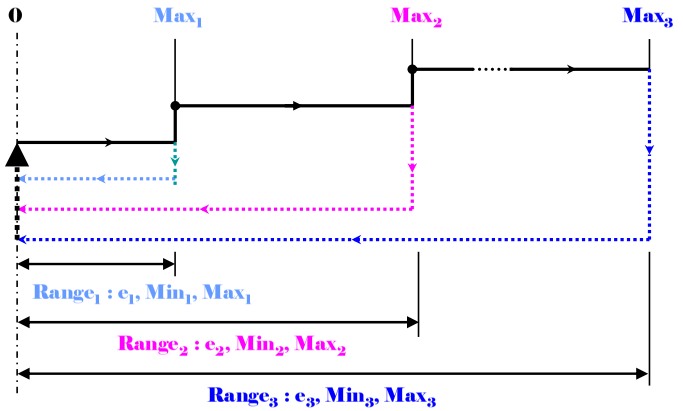
Multiple-range

- Automatic selection is allowed when load exceeds Max gross weight of range being in operation

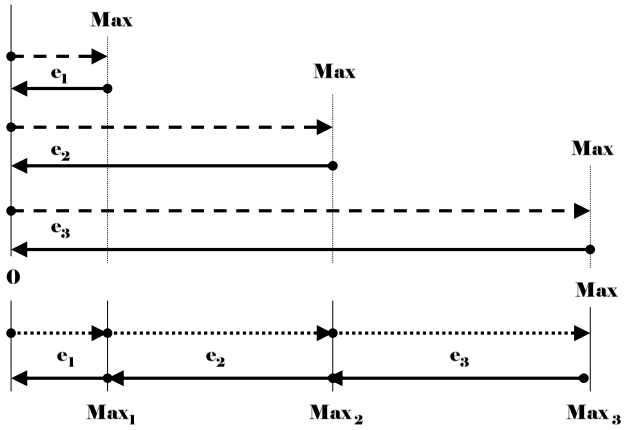
  From a greater to a smaller weighing range when there is no load on the load receptor

  - and indication is zero or negative net value
  - tare operations is cancelled
  - and zero is set within 0.25 e_1

Multiple-range auto change



Multiple-range /Multi-interval



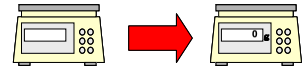
Zero-setting device

Zero-setting device is a device for setting the indication to zero when there is no load on the load receptor.

- initial zero-setting device
- automatic zero-setting device
- semi- automatic zero-setting device
- non-automatic zero-setting device

Zero-setting device

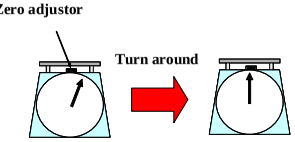
(A) Initial zero-setting device



(B) Automatic zero-setting device

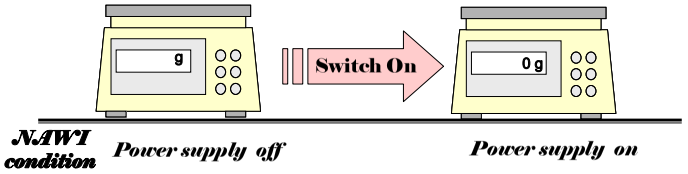
(C) Semi-automatic zero-setting device

(D) Non automatic zero-setting device



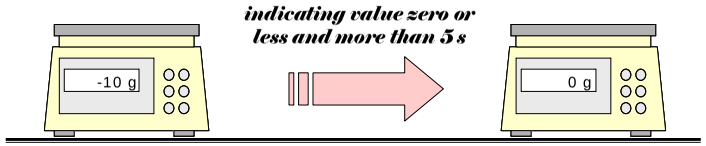
Initial zero-setting device

- Initial zero-setting device is a device for setting to zero automatically at the time the instrument is switched of Power Supply on and before it is ready to use



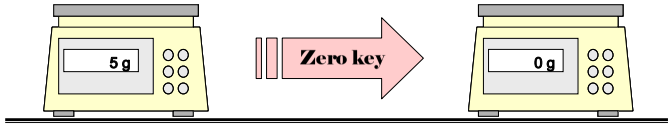
Automatic zero setting device

- Automatic zero-setting device is a device for setting to zero automatically, only allowed when zero-point is negative, not allowed to operate when indication is positive



Semi- automatic zero setting device

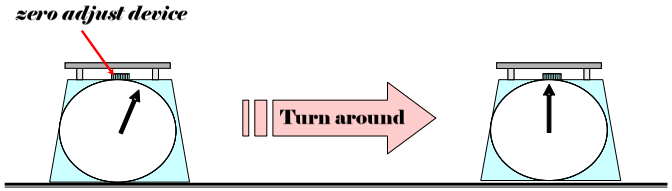
- Semi- automatic zero-setting device is a device for setting the indication to zero automatically following a manual command



AIST

Non automatic zero setting device

- Non-automatic zero-setting device is a device for setting the indication to zero by operator



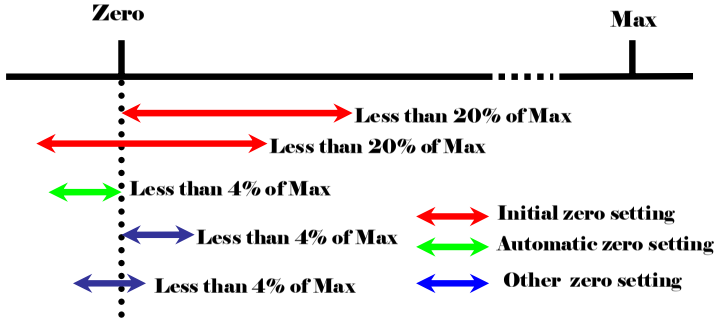
AIST

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
- The range is 20 % of Max for initial zero-setting device unless instrument complies with metrological requirements ,than more than 20% is allowed
- The equilibrium is stable

AIST

Zero setting device
(Maximum effect)



AIST

Zero-tracking device

- zero-tracking device is a device for maintaining the zero indication within certain limits automatically

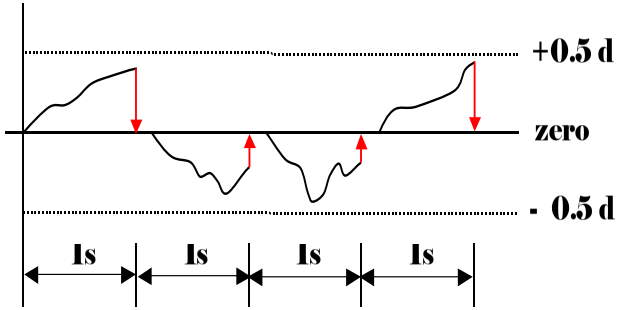
AIST

Zero-tracking requirements

- the indication is at zero or negative net value
- the equilibrium is stable
- the corrections are not more than 0.5 d per one second
- the range is not than 4% of Max

AIST

Zero-tracking



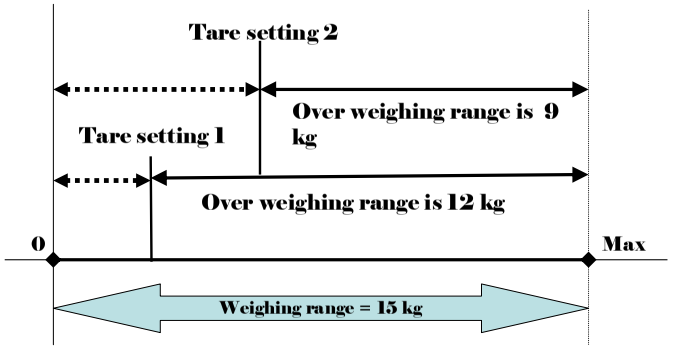
AIST

Tare device

- Device for setting the indication to zero when a load is on the load receptor
- Two types:
  - setting to zero without altering the weighing range for net loads(additive tare device)
  - Setting to zero reducing the weighing range for net loads (sub-tractive tare device)

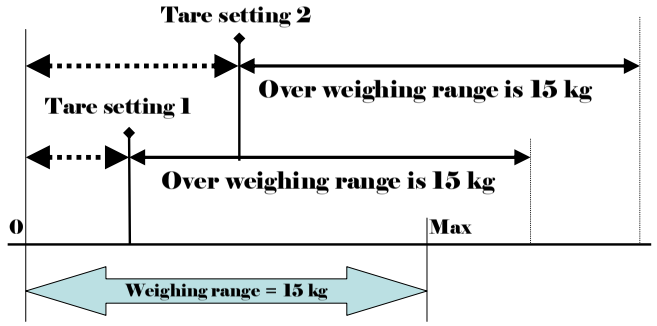
AIST

Tare device
(Sub-tractives tare)



AIST

Tare device
(Additive tare)



AIST

Tare device
(Functional requirements)

- If more than one tare device is in use,tare value should be clearly designated
- If tare value is printed,they should be designated with T and the net value should be designated with N

AIST

Tare device
(Metrological requirements)

- accuracy 0.25 e or 0.5 d for auxiliary indicating device
- operating range as indicated
- not bellow or at zero point
- the equilibrium is stable

AIST

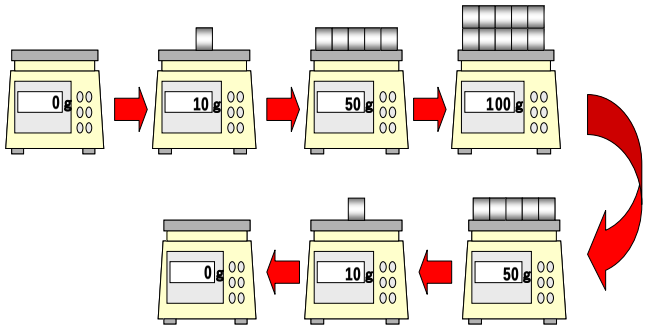
Test Items

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

AIST

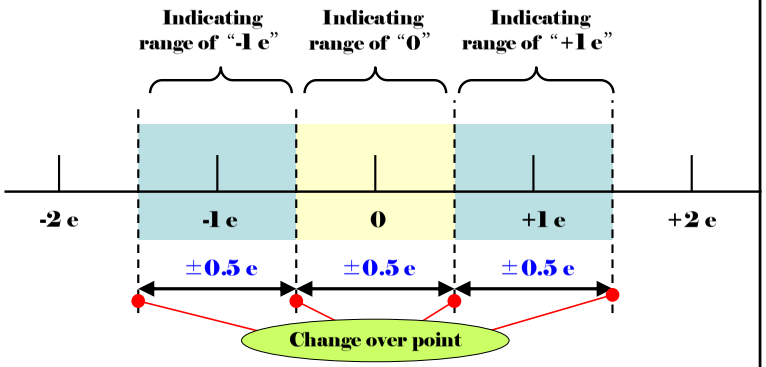
Standard Procedure for WPT



(WPT : Weighing Performance Test)

AIST

Weighing Performance Test
(Rounding of indication)



AIST

Error Formula

$$E = I + 1/2e - \Delta L - L = P - L$$

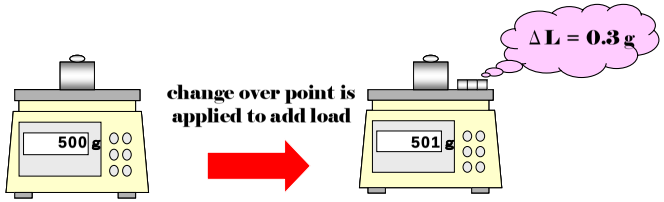
I = Indication
e = Verification scale interval
L = Load
ΔL = Additional load to next change over point
P = I + 1/2e - ΔL = indication prior to rounding
E = I - L or P - L = error
$E_c = E - E_0$ with E_0
= error calculated at or near zero (*)

AIST

Weighing Performance Test

Example: e = 1 g

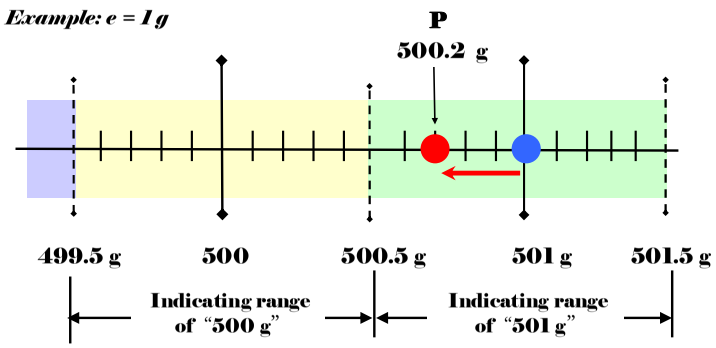
Load	Indication	Add.load(Δ L)	Error
500 g	500 g	0.3 g	?



E = 500 + 0.5 -0.3 – 500 = + 0.2 g

AIST

Weighing Performance Test



AIST

Error Formula

Load(L)	Indication (I)		Add.Load (⊿L)		Error (E)		Corrected erorr (Ec)		mpe
	↓	↑	↓	↑	↓	↑	↓	↑	
(*)									

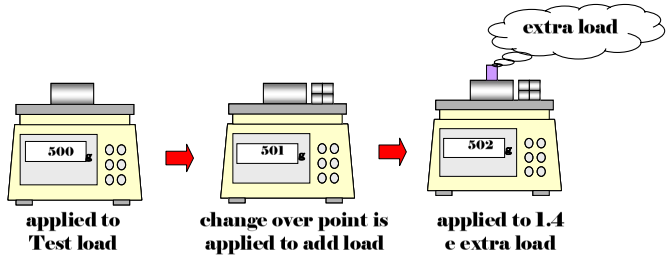
$$E = I + 1/2e - \Delta L - L$$

AIST

Discrimination Test

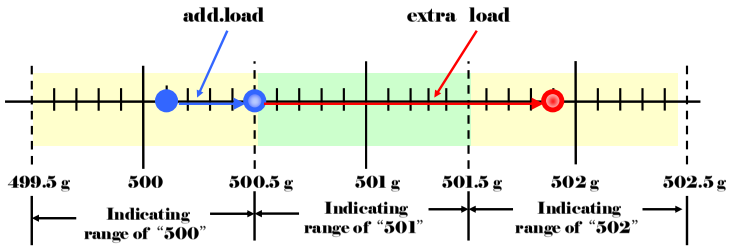
Unit : g

Load	Indication	Add.load (Δ L)	Indication (I_1)	Extra load	Indication (I_2)	I_2-I_1
500	500	0.4	501	1.4	502	1



AIST

Discrimination Test



AIST

Discrimination Test

Digital indication

Load (L)	Indication (I)	Removd load (⊿L)	Add 1/10d	Extra load =1.4d	Indication I_2	$I_2 - I_1$

☐ Passed ☐ Failed

Analogue indication

Load (L)	Indication (I_1)	Extra load = | mpe |	Indication (I_2)	$I_2 - I_1$

☐ Passed ☐ Failed

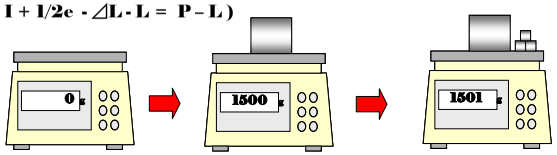
AIST

Repeatability Test

Example: Class

No	Load	Indication	Add.load(⊿L)	P
1	1500	1500	0.3	1500.2
2				
3				

(E = I + 1/2e - ⊿L - L = P – L)



zero setting and check | applied to Test load | change over point is applied to add load

AIST

Repeatability Test

Verification scale interval e: .....

Test load : .....

P = I + 1/2 e-⊿L

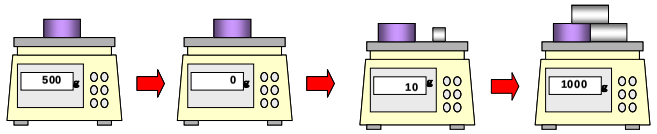
No.	Indication (I)	Add.load (⊿L)	P	No.	Indication (I)	Add.load (⊿L)	P
1				6			
2				7			
3				8			
4				9			
5				10			

Max -Min ☐ mpe ☐

☐ PASSED
☐ FAILED

AIST

Tare weighing performance test



applied to Tare value | Tare key | Weighing test

Tare weighing performance test

TARE WEIGHING PERFOMANCE

Verification scale interval e: _____

Tare weight: ☐

E=I+I/2e-⊿L-L

Ec=E-Eo with EO= error calculated at or near zero(∗)

	Load (L)	Indication (I) ↑	↓	Add.load (⊿L) ↑	↓	Error (E) ↑	↓	Corrected error (Ec) ↑	↓	mpe
(∗)										

☐ PASSED ☐ FAILED

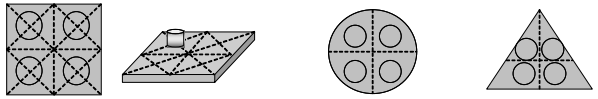
Remarks:

Eccentricity test

Instrument with a load receptor with Four or Less points of Support

Test load:

1/3 of the sum of the maximum capacity and the maximum additive tare effect



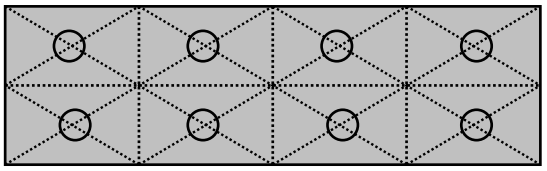
◯ **Load positions**

Eccentricity test

Instrument with a load receptor with more than Four points of Support

Test load:

1/(n-1) of the sum of the maximum capacity and the maximum additive tare effect



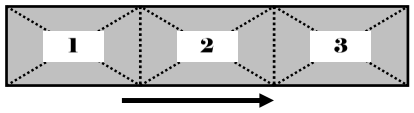
◯ **Load positions**

Eccentricity

Instrument used for weighing Rolling loads

Test load:

Usual rolling load, the heaviest and the most concentrated one which may be weighed, but not exceeding 0.8 time of the sum of the maximum capacity and the maximum additive tare effect



driving direction

AIST

Eccentricity Test

ECCENTRICITY

Verification scale interval e: ☐

E = I + 1/2e-⊿L-L

Ec = E-Eo with E0 = error calculated at or near zero(⋆)

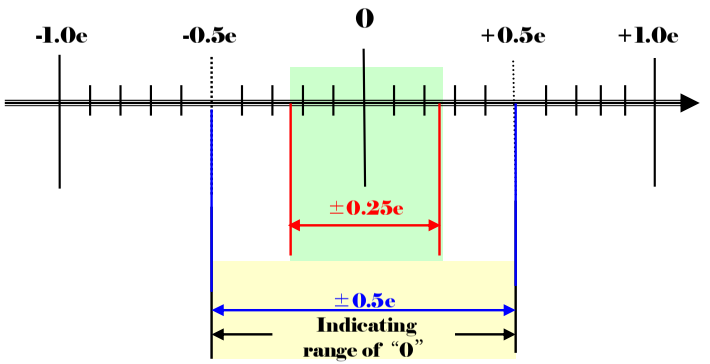
	Location	Load (L)	Indication (I)	Add.load (⊿L)	Error (E)	orrected err (Ec)	mpe
(⋆)							
(⋆)							
(⋆)							
(⋆)							
(⋆)							

☐ PASSED ☐ FAILED

AIST

Zero accuracy test

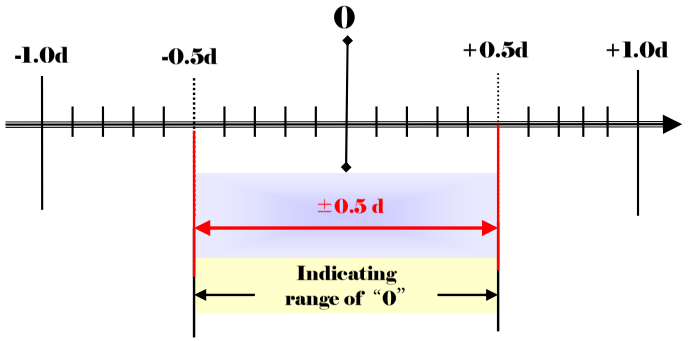
(case of "e")



AIST

Zero accuracy test

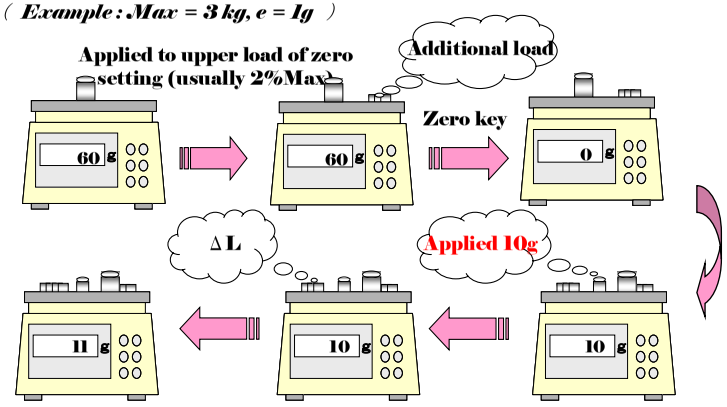
(case of "d")



AIST

Zero setting accuracy

(Example : Max = 3 kg, e = 1g)



Change over point is applied to add load

AIST

Zero-setting accuracy test

ZERO- SETTING ACCURACY

Verification scale interval e: _____

E = I+1/2e-⊿L-L

Load (L)	Indication (I)	Add.load (⊿L)	Error (E)	mpe

☐ PASSED ☐ FAILED

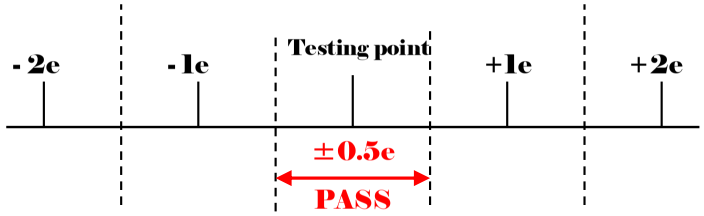
AIST

Simplified procedure

To determinate Pass or Failed using the load of 1/2e and 1/4e.

AIST

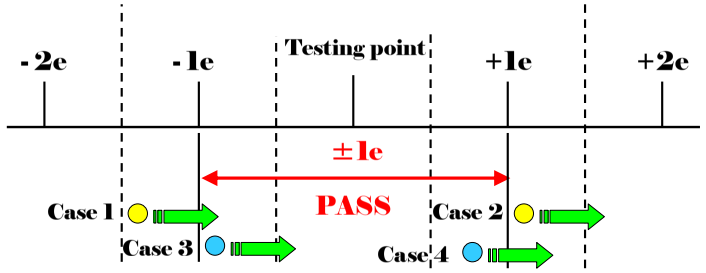
Simplified procedure
(Maximum Permissible Error : ±0.5e)



(Reference : see N.MI V1 4.1)

AIST

Simplified procedure
(Maximum Permissible Error : ±1e)

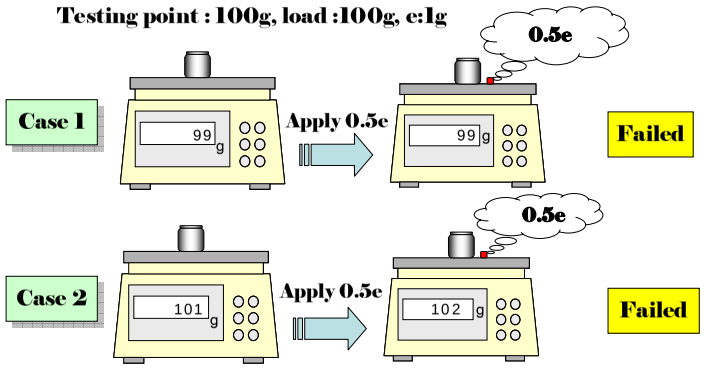


(Reference : see N.MI V1 4.1)

AIST

Simplified procedure
(Maximum Permissible Error : ±1e)

Testing point : 100g, load :100g, e:1g

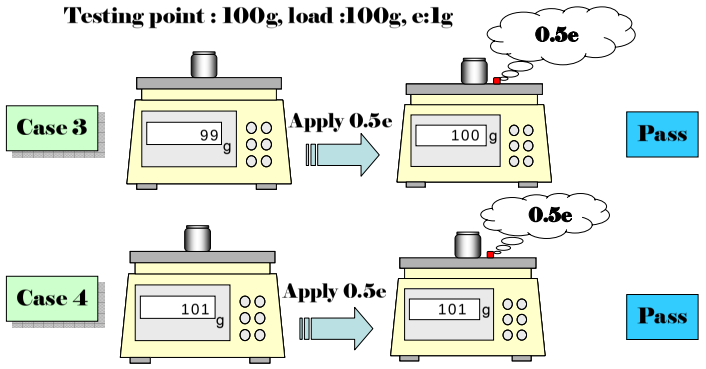


(Reference : see N.MI V1 4.1)

AIST

Simplified procedure
(Maximum Permissible Error : ±1e)

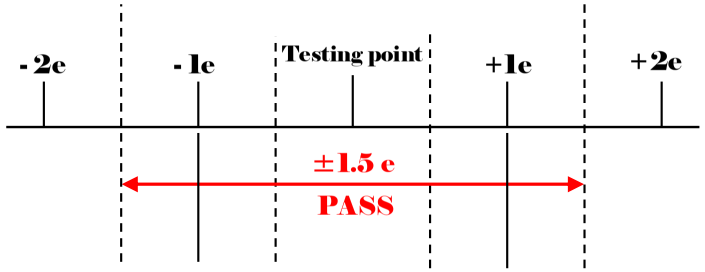
Testing point : 100g, load :100g, e:1g



(Reference : see N.MI V1 4.1)

AIST

Simplified procedure
(Maximum Permissible Error : ±1.5e)



(Reference : see N.MI V1 4.1)

AIST

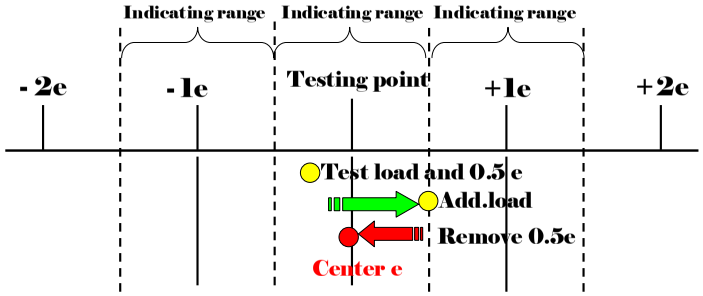
Simplified procedure
(Maximum Permissible Error)

mpe	Indication (A)	Indication (B)	Pass or Failed
±0.5e	Same	–	Pass
	±1 e	–	Failed
±1.0e	Same	–	Pass
	+1 e	Not change	Pass
		Change of +2e(for testing point)	Failed
	-1e	Change (for testing point)	Pass
		Not change	Failed
	±2e	–	Failed
±1.5e	±1 e	–	Pass
	±2 e	–	Failed

Note : Indication (A) :Relation between test load and indication (?)
(B) :After apply add load 1/2e (?)

AIST

Simplified procedure
(Repeatability 1 : Center e)

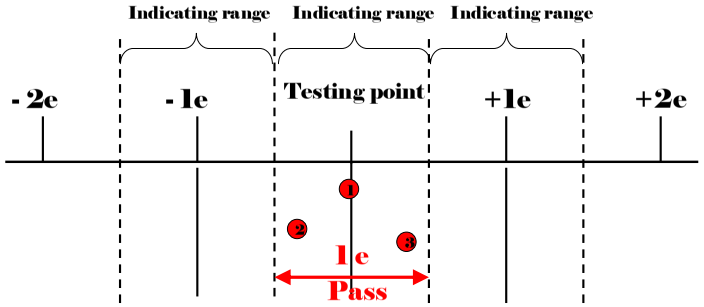


Second and third indication : Apply center e load

(Reference : see NMI VI 5.1)

AIST

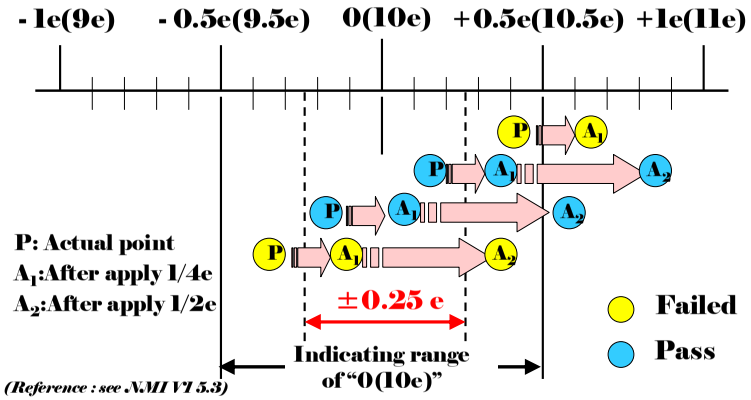
Simplified procedure
(Repeatability 2 : mpe)



All three loads show the same indication then this is pass

AIST

Simplified procedure
(Zero setting accuracy : case of "e")



(Reference : see NMI VI 5.3)

AIST

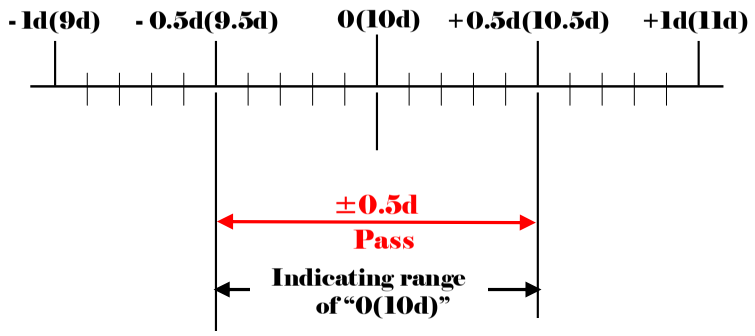
Simplified procedure
(Zero setting accuracy : case of "e")

Indication	applied 1/4e	applied 1/2e	Pass or Failed
0(10e)	Change	–	Failed
	Not change	Change	Pass
	Not change	Not change	Failed
±1(9,11e)	–	–	Failed

AIST

Simplified procedure

(Zero setting accuracy : case of "d")



(Reference : see NMI VI 5.3)

Economy REPORT
OF
METROLOGY IN CAMBODIA

Presented by:
Mr. SOK Narith
Official, Department of Metrology,
Ministry of Industry, Mines and Energy.

APEC /APLMF Training Course On
"The Verification of Non-Automatic Weighing Instruments"

From September 12-16, 2005,
in Republic of Indonesia.

 # 45, Preah Norodom Blvd., Phnom Penh, Cambodia
Tel : (855) 23 211 141
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1-About Department of Metrology

The Department of Metrology of Cambodia is a national body for Legal Metrology within the General Direction of Industry, which belongs to the Ministry of Industry, Mines and Energy. The mission of Department is:

- maintain national measurement standards
- provide industrial calibration services
- implement the Metrology Law and its Regulations

2- Structure of Metrological Authorities

2-1- Department of Metrology

According to the Sub-decree No 35 AK/PK dated on April 26th, 1999 of the Royal Government of Cambodia, referred to the article No. 10, Department of Metrology is responsible for:

-To implement the National Metrology Policy and issue documents concerning manufacture, import-export and repair of manufacturing equipments;

-To assure the conservation of the primary (installed at ILCC) and secondary standards;

-To ensure the proper design, verification and use of the weighing and measuring instruments;

-To review the need, establish the work plan and monitor the implementation;

-To carry out the evaluation and supervision of weighing and measuring instruments to ensure their effectiveness and efficiency;

-To disseminate and improve the national technology of metrology;

-To organize the training of metrological staff;

-To administer metrological laboratories;

-To co-operate with International Metrology Organizations.

2- Structure of Metrological Authorities (con't)

2-2- Provincial Metrology Office

The Department of Metrology provides technical advice to the provincial metrology office that operates in the 24 provinces and cities of Cambodia. Every province and city has an office of metrology and shares the responsible with Department as follow:

- Verification, Re-Verification and Inspection of the weighing and measuring instruments used in business transaction in their local levels.
- Supervision the lower technology of weighing and measuring instruments in their local levels.
- The provincial metrology offices maintain the Working Standards.

3- Law and Regulation

The legal metrology in Cambodia was operated on:

- Circular No. 3 DT/PMC. It is an administration on the metrological supervision for weighing and measuring instruments used in business transaction.
- Prakas No. 598 MIME/DOM/PK. It defines the control and verification on Pre-Packaged Goods.
- Sub-decree No. 35 AK/PK. It defines the Organization and Functioning of the Ministry of Industry, Mines and Energy and the Role of Department of Metrology.
- Law on "Management of Quality and Safety of Products and Services ".

Presently, there is no National Metrology Law giving power to the Department of Metrology to carry out the Legal Metrology Activities. For the time being, a draft "National Metrology Law "prepared by UNIDO expert is under reviewed by the Ministry of Industry, Mines and Energy (MIME). Also, UNIDO expert has been drafted the following regulations:

- Definition of SI Unit
- Requirements for Domestic Water Measures
- Requirement of Weights and Measures (Include: Measurement of Length, Mass, Weighing instruments and Liquid Fuel measuring instruments).

4- Current situation on activities on NAWI

Under the Technical Regulations, all weighing and measuring instruments which used in business transaction must be verified by comparison with the standards of weights and measures. There are three types of verification namely initial verification, periodic verification and unexpected verification. The verification interval of the periodic verification is one year. After verification, the competent officers shall grant the verification mark and affix or display on those instruments and seal them. Or if they are failed, those instruments must be repaired or re-adjusted and re-verify before use. The permissible tolerance is $\pm$ 0.5 % for ordinary instruments and $\pm$ 0.03% for highest instruments (ex: instruments used for precious stone, gold etc.).

In Cambodia there are no manufacturers producing the balances. We have observed that most instruments are imported from overseas. The most types of instruments are mechanical balances and used in the markets and production places. In generally, those instruments are ordinary balances and the maximum capacity range of 1kg, 2kg, 5kg, 10kg, 12.5kg, 15kg, 20kg, 25kg, 60kg and 100kg for the automatic balances and for platform balances range of 100kg, 500kg, 1000kg and 5000kg.

4- Current situation on activities on NAWI (con't)

The number of verification is increased from year to year for the whole country because of the growth population and the consumption of balances need more in the markets. For electrical balances has small number and used in the supermarket and factories. For performance this task, we meet the obstacle, because we lack of human resources and limited budget for implementation. Cambodia likes other least developed countries we need support from the international agencies donors to develop the metrology field.

Cambodia is the corresponding member of OIML and full member of APLMF, therefore regarding to the international standards (OIML recommendation) we comply with these documentations in order to meet the international standards. Metrological management in Cambodia is in the first stage of experience that needs to strengthen for the possibility of regionalization and globalization for the integration in the regions.

Thank you for your kind attention

NAWI in China

NIMTT

by

Xue Liang

Senior Engineer – China

Self Introduction

NIMTT

Work in Institute of Machine Testing , National Institute of Measurement and Testing Technology in China

Worked for about 12 years

NIMTT was founded in 1965

It's a National legal institute of metrology and technology

中国测试技术研究院

Self Introduction

NIMTT

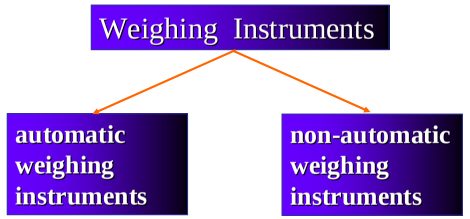
We have many departments, such as length, mechanics, pyrology, chemistry, optics, electromagnetism, etc.

I am mainly in charge of verification and testing of weighing instruments and weights.

Legal Metrology System in China

NIMTT

In PR. China, the Metrology institute implements the measurement law.



Legal Metrology System in China

NIMTT

non-automatic weighing instruments

- self-indicating instruments
- non-self-indicating instruments

NIMTT

self-indicating instruments

- analog indicating instruments
- digital indicating instruments

The maximum measuring range can reach 200t

Legal Metrology System in China

NIMTT

In China , Initial verification and re-verification by legal institute on weighing instruments are mandatory.

The re-verification period is one year or a half year if necessary.

Legal Metrology System in China

NIMTT

Problem?

We do have some problems in implementing the legal metrology system, such as budget shortage.

Non Automatic Weighing Instruments (NAWI)

NIMTT

There are more than 1,000 weighing instruments manufactories all over the country.

ZEMIC

METTLER TOLEDO DIGI ISHIDA HBM

sartorius Yamato SCHENCK Thermo Ramsey

Non Automatic Weighing Instruments (NAWI)

NIMTT

The total production value in 2004 is about RMB 10 billion.

The weighing instruments export is about 400 million dollar.

Non Automatic Weighing Instruments (NAWI)

NIMTT

According to the statistic on 150 manufacturers in 2004 ,

- the turnout of business weighing instruments are 4 million pieces
- the industry weighing instruments are 20,000 pieces
- the balances are about 260,000 pieces.

Non Automatic Weighing Instruments (NAWI)

NIMTT

In PR. China, we have a national metrology institute and many local metrology institutes.

Therefore, it is difficult to take a statistic on the total verification.

Non Automatic Weighing Instruments (NAWI)

NIMTT

For example, in Chengdu city, there are more than 5000 NAWI (including balances) are verified and inspected each year.

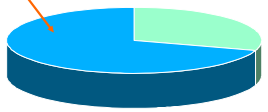
Its number is increasing every year.

Non Automatic Weighing Instruments (NAWI)

NIMTT

The major purpose to use NAWI is for trade and industry weighing.

In all kinds of NAWI, electronic instruments occupies more than 70 percent.



Non Automatic Weighing Instruments (NAWI)

NIMTT

Medium accuracy instruments are most commonly used.

Those of which the maximum capacity is from 3kg to 60kg are most commonly used.

Compliance to OIML R76

NIMTT

In PR. China, we use JJG555-96 General Verification Regulation for Non-automatic Weighing Instruments to carry through verification.

This regulation is semi-equivalent to OIML R76.

There are some differences between them.

Compliance to OIML R76

NIMTT

R76 includes non-automatic weighing instruments and non-automatic balances.

But JJG555 includes only non-automatic weighing instruments and excludes non-automatic balances.

Compliance to OIML R76

NIMTT

To sum up , weighing instruments play a very important role in China.

End of Seminar

NIMTT

Gian Subagus

Metrology - Departement of Industrial and Trade of South Sumatera Province

Work - 1995
- 10 Years

2. Legal Metrology System

a. Measurement law is implemented by Government and Metrology Institute

b. The types of weighing instruments and measuring range
- NAWI and AWI
- measurement between class II to IIII.

c. Verification and re verification

Period : 1 x 1 Year
1 x 2 Year, etc

d. The problem in order to implement the Legal Metrology System
- Budget ------- Limited
- Human Resources --- Quality & Quantity

3. NAWI

* Manufacturer – No one

a. Verifications & Inspections

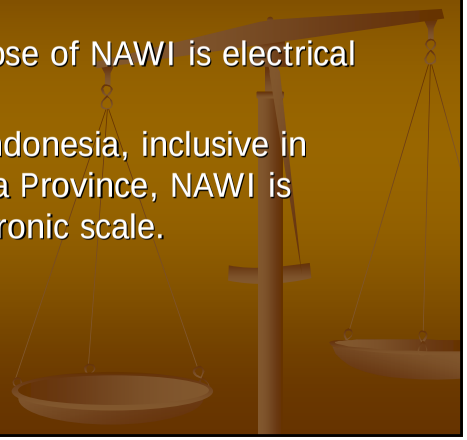
Verifications 2004 : 74.733 inst
2003 : 40.069 inst
Increased 34.664 ------- 86,51 %

b. Inspections 2004 : 1.483 inst
2003 : 639 inst
Increased 844 ------- 132,08 %

c. Major Purposes or targets to use NAWI

Our main purpose of NAWI is electrical instrument.

At present in Indonesia, inclusive in South Sumatera Province, NAWI is applied in electronic scale.



d. Instruments most commonly used.

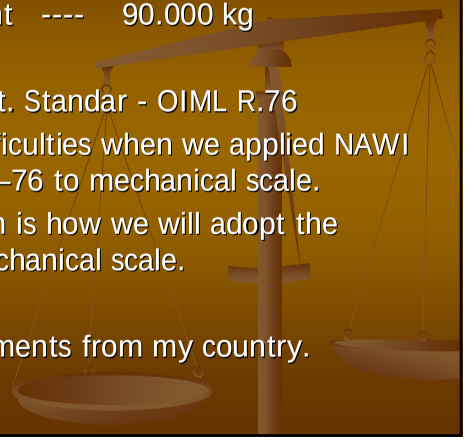
- accuracy class ---- III (Medium Class)
- max cap. weight ---- 90.000 kg

e. Compliance of Int. Standar - OIML R.76

We are facing difficulties when we applied NAWI based on OIML R–76 to mechanical scale.

Our main problem is how we will adopt the regulation for mechanical scale.

4. No other requirements from my country.



LAOS

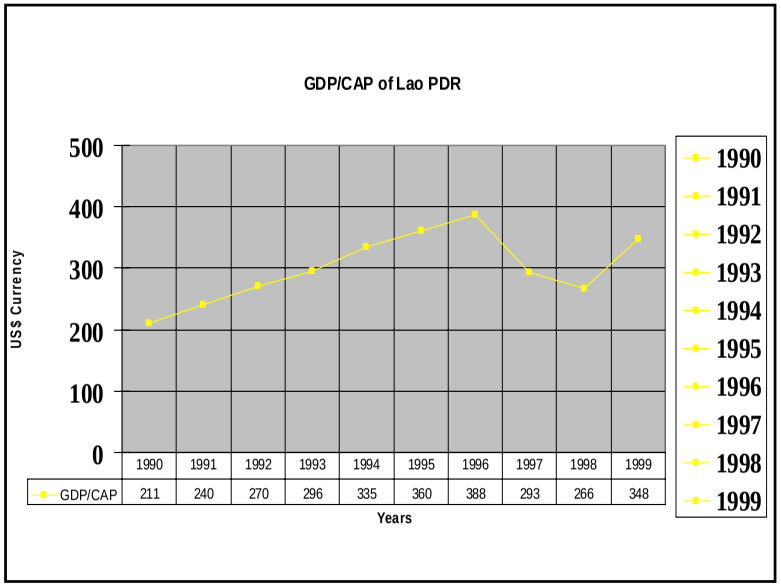
The official name:
Lao People's Democratic Republic

Capital : Vientiane

Area : 236,800 square kilometers
91,430 square miles

Population : 5,406,0415 (1999 estimated)
(With a Population growth rate of 2.76 percent)

Population density : 22 persons per square kilometer
58 persons per square mile



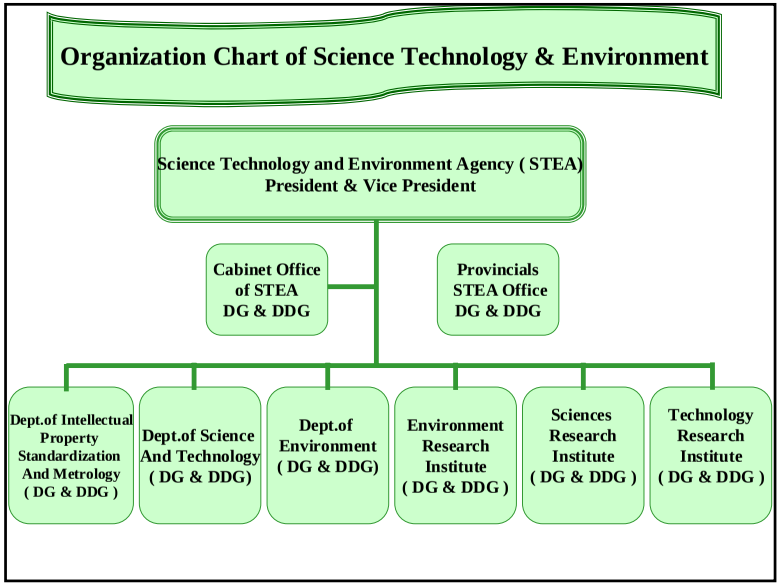
The Metrology System in Lao
was established since 1993

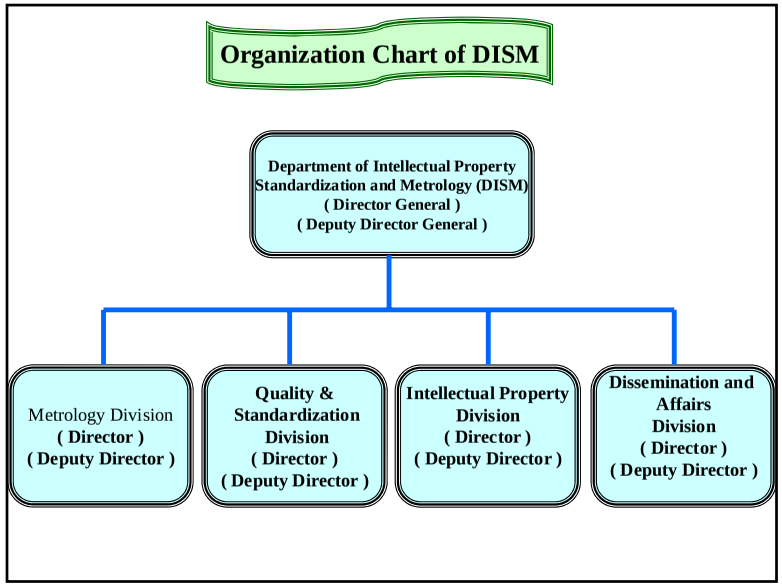
UNDER
/RES

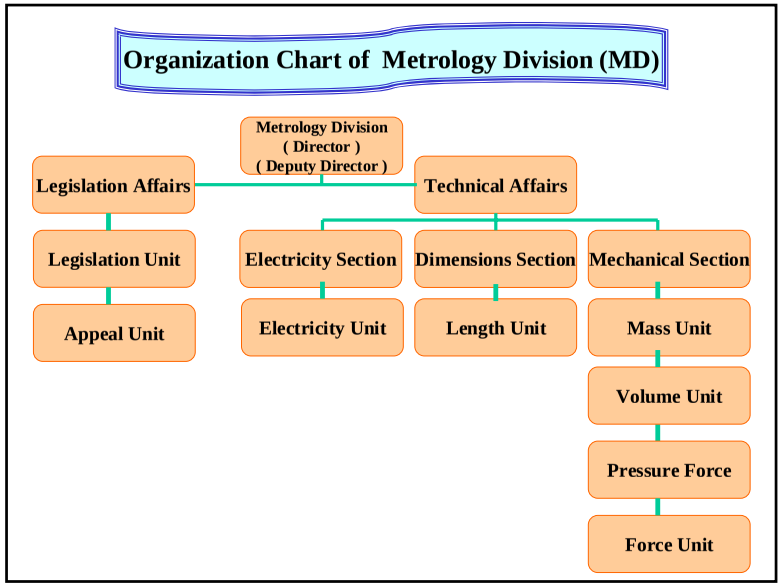
Department of Intellectual Property
Standardization and Metrology (DISM),
Science Technology and Environment Agency (STEA)

PART
OF

Prime Minister's Office.







Legislations

1. **Decree on Metrology Management issued by the Prime Minister in October 26,1993.**
2. **Regulation on Registration of Measurement Instruments (No 233/STEA. March 10,1994).**
3. **Guidelines on Registration of fuel Dispenser and Testing (February 07,2001).**
4. **Regulation on Pre-packaged goods (Drafted)**
5. **Regulation on Road Tankers registration (Drafted)**
6. **Metrology Law (Drafted)**

Activities on NAWI

- **All Measuring Instrument as well as Weighing Instruments (WI)have been registered at STEA Office for initial verification and re-verification.**
- **After registrations, the measuring instruments registered shall be tested and inspected for the accuracy or others matters concerned to the requirements (some of them has been yet carried out due to lacked of related equipments) and which the performance of testing and inspection is one time/year.**
- **Regarding the testing and inspections, we are trying to conform with the regional and international systems such as recommendations OIML R79 and OIML R87 for Pre-packaged goods but OIML R76 we are not yet familiarized to all.**

Activities on NAWI (Cont.)

- Lao. PDR doesn't has any manufacturers on NAWI, and most of WI are imported and used for weighing :
  1. **Luggage in Airports,**
  2. **Products goods in super and mini-markets,**
  3. **Raw materials for export-import to industrials,**
  4. **Trucks which purpose to control and manage national roads a long the country.**
  5. **Chemicals products at chemist's Labs**

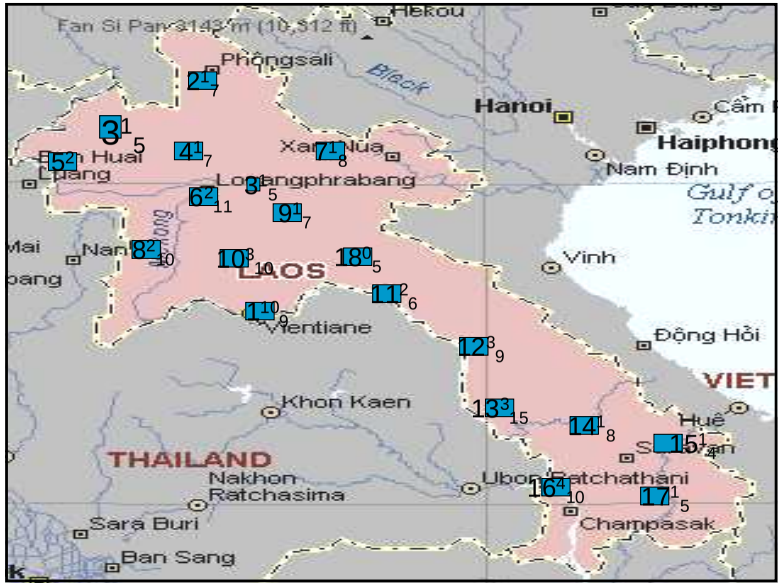
Activities on NAWI (Cont.)

- The accuracy class of the WI used in the country , it depended on the purpose of using and it range from class IIII to II
- The maximum capacity of WI is less than a 100 tons and the commonly used are class IIII and III.

Conclusion

Regarding the development in the fields of Legal Metrology system in Lao. PDR and compare to the scope of Legal Metrology as well as to others ASEAN members countries as well Asia-Pacific island countries Lao is still undeveloped due to:

- Lacked of skills and experiences of human resources , and a suitable measuring instrument to carry out and achieve the metrology activities,
- Limited financial support for providing of basic infrastructure both legal and physical to perform test and inspection day to day .



THANK YOU

FOR YOUR PATIENT ATTENTION

Scope of legal metrology
study future needs in legal metrology

- Industries, manufacturing and others,
- Commerce,
- Health and safety,
- Environment protection,
- Science,
- Communications and transportation,
- Enforcement of government regulations,
- National and international metrological harmonization,
- Availability of competent specialized personnel for everything relating to legal metrology.

Scope of legal metrology
study future needs in legal metrology (cont'.)

- Surveying and navigation,
- The protection of persons from incorrect measurements significant for health and safety, or the economic of the country, through either direct actions or supervision,
- Equal condition for competitiveness derived from correct measurements,
- improvement of metrological capabilities in small and medium sized industries,
- Traceability of measurements units in use to national and international measurement standards,
- Use and promotion of uniform and equivalent procedures for tests and supervision of measurements,
- Regional and international cooperation

VERIFICATION OF NON – AUTOMATIC WEIGHING INSTRUMENTS (NAWI) IN MALAYSIA

BY

ROSLEY BIN ABDULLAH

MINISTRY OF DOMESTIC TRADE AND CONSUMER AFFAIRS,MALAYSIA

INTRODUCTION

- Enforcement Division of Ministry Of Domestic Trade And Consumer Affairs (MDTCA) is the regulatory authority For Legal Metrology in Malaysia.
- Enforcement of weights and measures Act 1972 for control and administrator of weighing and measuring instruments used for trade.
- National Authority For Legal Metrology
- Verification and re-verification weighing and measuring instruments used for trade in Malaysia.

CUSTODIAN OF WEIGHTS AND MEASURES

- The weights and measures Act requires that all measurements must be traceable to the National Standards of Measurements maintained by the custodian of weights and measures.
- Custodian of Weights and Measures – National Metrology Laboratory, SIRIM Bhd.
- National Standart Primary, Secondary, Tertiary Standards Working Standard kept and maintain by : Inspectors of weights and measures MDTCA

LEGISLATIONS GOVERMING STRANDARTS FOR MEASUREMENTS, CONTROL AND ADMINSTRATOR OF WEIGHING AND MEASURING INSTRUCTORS

. Weights And Measures Act 1972

. Weights And Measures Regulations 1981

. Pattern Or Specification For Weights Or Measures Or Instruments For Weighing Or Measuring Order 1981

OBJECTIVES
of Weights and Measures Act

- To ensure only the S.I. unit is used for measurement throughout Malaysia
- To ensure all weights and measures and instruments for weighing and measuring used for trade complies with the pattern and pecifications, verified and re-verified by the Weights and Measures to Measure Inspector. All Weighing and measuring instrument used for trade and required to be re-verified every year.
- To monitor activities of manufacturers, repairers and sellers of weighing and measuring instruments by requiring them to obtain a licence from the Chief Inspector of Weights and Measures.

TYPE OF WEIGHING INSTRUMENTS

- There are many types of weighing instruments approved in Malaysia such as

a) Spring Balance / ScaleS (Mechanical and Electronic)
b) Counter Machines
c) Platform Weighing Machines
d) Weighbridges
e) Beam Scales and balance

1. Specs for working standards for Volumetric Measures
2. Meter Comparator

Specs of working standard for weight

Electronic Counter Scale

Working Standard for Weighbridges

METHOD TO VERIFY WEIGHING INSTRUMENTS

- Physical Inspection

(Material and principles of construction of the weighing instruments) – According pattern specsificasions order1981 – published by custodian.

Testing of Weighing Instruments base on what types of weighing instruments. Testing can be done by:-

a) It is properly balance when unloaded

b) Accuracy by using working standarts

c) Vibrating weighing instruments shall be tested for sensitiveness by loading the instrument with the maximum testing load. The addition of the weight shall cause the beam or steelyard or dials to rise or fall to the limit of its range of movement.

d) Platform weighing machines and weighbridges shall indicate the same weight within half the prescribed limit of error when a load equal to one-quarter (or as near thereto as is practicable) of the capacity of the instrument is placed successively in the centre and near each end or corner of the platform.

- Spring balances shall be tested by means of both increasing and deceasing loads, and the spring allowed to vibrate and stop before the reading is taken.
- Spring balances shall not be tested for sensitiveness.
- Permissible error is > 1- 2 division for weighbridges and we try to set up zero point if possible after verification.

TOLERANCE FOR SPRING BALANCES/SCALES

SPRING BALANCES/SCALES

Scale Capacity	Scale Indication		Verification Tolerance
30 kilogram's or less	1/4 capacity or less	…..	0.5 division
	over 1/4 capacity	…..	1.0 division
Over 30 kilogram's	1/2 capacity or less	…..	0.5 division
	over 1/2 capacity	…..	1.0 division

CERTIFICATE OF VERIFICATION

- All weighing instruments which pass the test and fit for use for trade will be issued with verification a certificate.
- Verified instruments will be affixed with a security label and sealed.

PRIVATISATION OF VERITICATION AND REVERIFICATION OF WEIGHING AND MEASURING INSTRUMENTS

Since April 4, 2005 verification and re-verification of weighing and measuring instrument use for trade purposes have been privatized to Metrology Corporation Sdn Bhd, a private company licensed by the Minister of Domestic Trade and Consumer Affairs to undertake this function which was formerly performed by Inspectors of Weights and Measures. 104 Inspectors of Weights and Measures from Ministry have now been employed by the company.


MINISTRY OF DOMESTIC TRADE AND CONSUMER AFFAIRS
MALAYSIA
PENGUATKUASA
THANK YOU

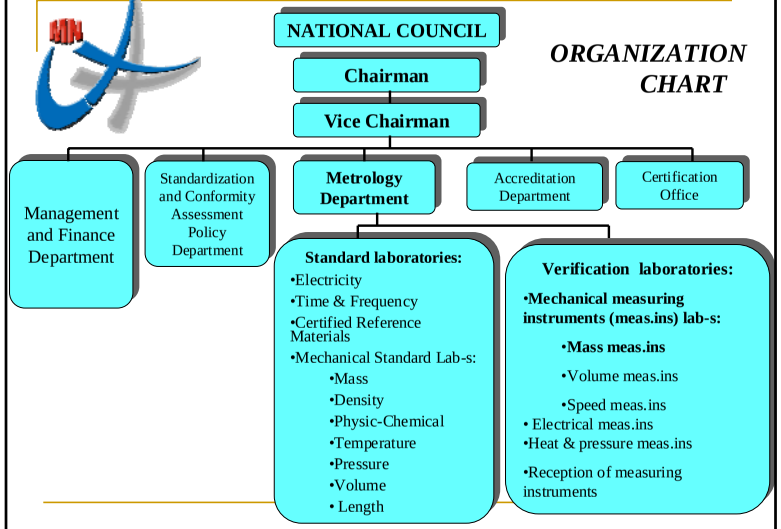
MONGOLIAN AGENCY FOR STANDARDIZATION AND METROLOGY

Mongolian Agency for Standardization and Metrology (MASM)

Main functions:

1. Standardization
2. Metrology
3. Testing
4. Accreditation

ORGANIZATION CHART



BRIEF HISTORY

1924 –Weights and Measures Unit was established
1931 – It was changed to Commission of Measuring Instruments
1944 – Weights and Measures was established
1955 – It was changed to Administration for Measures and Measuring Instruments
1972 – State Committee of Quality, Standards and Measures was established
1988 – It was renewed to State Department of Standards
1990 – It was renewed to National Research Institute of Standardization, General Department of Metrology Bodies
1992 – It was renamed to Mongolian National Center for Standardization and Metrology
2002 – It was renamed to Mongolian Agency for Standardization and Metrology

Metrology Department

The Metrology Department of MASM performs to establish national measurement standard system, regulation on metrology and supervision of their implementation

Main activities

- Development of national measurement standards system
- Maintenance and improvement of measurement standards
- Dissemination national measurement standards
- Development of certified reference materials
- Calibration of measurement standards and measuring instruments with high accuracy
- **Verification of instruments as required by law**
- **Pattern approval of measuring instruments**
- **Licenses for metrological service and sale**

Legal Metrology in Mongolia

Mongolian Agency for Standardization and Metrology (MASM) is the state central metrology organization. Under the "Law on Traceability of Measurement Uniformity", the MASM manages the legal metrology system in Mongolia and coordinates the national calibration system for measuring instruments. Responsibility for the local metrology activities is executed by the 22 Aimag's (province) of country Metrology Centres. MASM provides professional and management guidance for the local metrology authorities.

Verification of Measuring Instruments

According to the 2003 renewed Metrology Law, measuring instruments have to be verified in below fields:

1. **trade and public service,**
2. **diagnostic in medicine and veterinary,**
3. **labour safety,**
4. **state environmental supervision,**
5. **activities related to the state defence and public security**

are subject to the state verification.

Example are given as follows:

1. **weighing scales,**
2. **cold and hot-water meters**
3. **oil meters, volume meters**
4. **heat meters,**
5. **single and three phase electricity meters,**
6. **blood pressure meters,**
7. **taximeters,**
8. **dosimeters,**
9. **radiation meters, etc.**

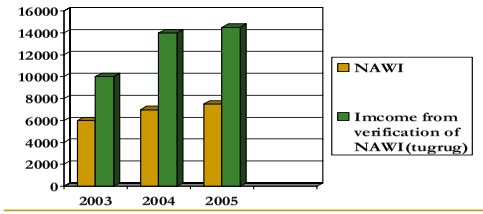
Non Automatic Weighing Instrument (NAWI)

About 14 thousand non automatic weighing instruments are verified annually and over 6 state verification officers executes this work in the Ulaanbaatar city.

Usually we verify NAWI with accuracy III and IV class as following types:

- **Mechanical balance with 2 tables ranging from 2 kg to 15 kg (of its weighing capacity)**
- **Mechanical balance platform tables ranging from 15 kg to 2000 kg**
- **Electrical balance ranging from 2 kg to 600 kg**
- **Vehicular ranging from 30000 kg to 150000 kg**
- **Balance with bridge ranging from 10 kg to 2000 kg**
- **Balance with conveyer ranging from 150 kg to 1000 kg**

50 percent of verified equipment is electrical type instruments occupied in all kinds of NAWI.



Mongolian National Standards for NAMI

MNS OIML R 76-1:2003
MNS OIML R 76-2:2003
MNS OIML R 34:1999
MNS OIML R 60:2003
MNS OIML R 74:1999

Problems in order to implement the legal metrology system in Mongolia

We have some difficulties in implementing the law such as human resources, not having good enough working standards for verification, and lack of heavy weights and other carrying instruments.

ADDRESS
Mongolian Agency for Standardization and Metrology
METROLOGY DEPARTMENT
210351, Ulaanbaatar
Bayanzurkh District
Peace Avenue – 46A
Post Office Box – 48

E-mail: masm@mongol.net

Phone: 976 11 262161
976 11 261578
Fax: 976 11 458032

The end

Thank you for your attention

PAPUA NEW GUINEA NATIONAL INSTITUTE OF STANDARDS & INDUSTRIAL TECHNOLOGY (NISIT)

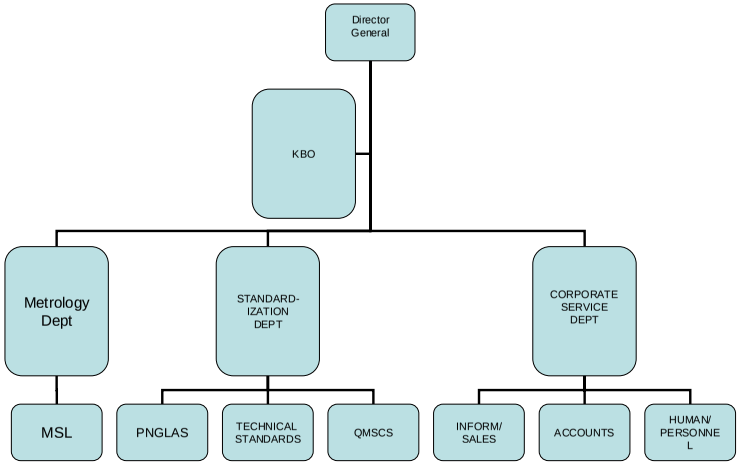
NISIT establishment

- An Act Passed By Parliament in 1993 known as the NISIT Act 1993, and was passed under the “Beyond the Mineral Boom Package”

FUNCTIONS OF NISIT

- **Development of Standards**
- **Sales of Standards**
- **Laboratory Accreditation**
- **Administration of Metrology and Legal Metrology in Papua New Guinea**
- **Provision of Calibration & Advanced Verification Services**
- **Quality System Certification (ISO 9000,ISO 14000,HACCPetc..)**

The NISIT Structure



Legal Metrology in Papua New Guinea

Legal Metrology in Papua New Guinea is covered by the following legislations

- Weights and Measures Act 1973;
- Packaging Act 1975
- NISIT Act 1993
- PNG Power Act
- Telecommunication Authority Act
- Food and Sanitation Act

Measurement Law in PNG

Legal Units of Measurement in PNG:

The International System – SI Units was gazetted and declared as PNG Legal Units of Measurement in 1980 under the National Standards Act 1978 (National Gazette No. G109, 24th December 1980) and was carried across to the NISIT Act 1993.

Metrology and Inspection powers both exist in

The NISIT Act 1993

Weights and Measure Act 1973 (Trade Measurement Act of ICCC)

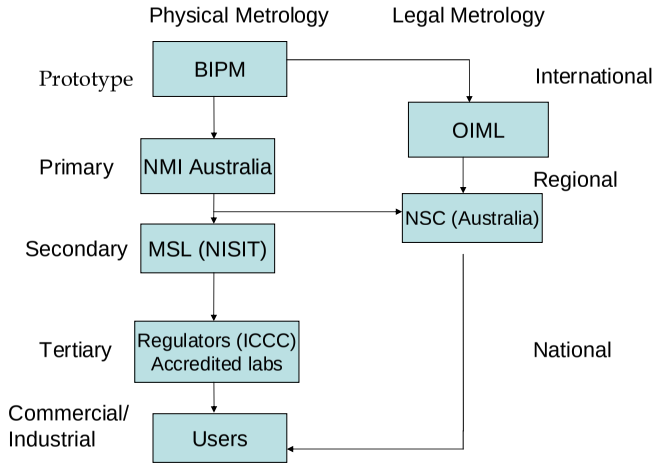
Cont'd

- **Under Metrology Dept of NISIT**
  Calibration Services for Industries, Govt, General Public
  Advanced Verification & Certification Services
  Metrology Training & Consultancy
  Inspection of W&M Inspectors

- **Under Trade Measurement (ICCC)**
  Inspection checks to Regulate the Trade Measurement Act, Packaging Act, and the Bread Act

Both Organizations have signed an MOU this year for better corporation to strengthen efforts for a stronger metrological base in the coming years

Traceability of Measurement



Role of Trade Measurement Inspector

- Check and verify all measuring equipment that are used for trade:
  - Light capacity scales
  - Heavy capacity scales
  - Safety scales (airport scales)
  - Shop scales
  - Pharmaceutical scales

Way Forward

- APLMF trainings to be run every year starting November this 2005.
  1. Fuel Dispenser
  2. NAWI
- Accreditation of all Metrological functions of the Govt
- Align all legislations to various OIML recommendations

END

TRAINING COURSE ON THE VERIFICATION OF NON-AUTOMATIC WEIGHING INSTRUMENTS (NAWI)

Jakarta, Indonesia
September, 2005

NATIONAL METROLOGY SERVICE - (SNM - INDECOPI) - PERU

LEONARDO DE LA CRUZ GARCIA

LABORATORY OF LENGHT AND ANGLE
LABORATORY OF MASS

LOCATION

Peru is a Latin American country.

It is located in the central and occidental part of South America

PERU IS THE FAMOUS LAND OF THE INCAS EMPIRE

INFORMATION

- Country (long form): Republic of Peru
- Capital: Lima
- Total Area: 1 285 220,00 square kilometers
- Population: 27 483 864 (July 2001 est.)
- Languages: Spanish (official), Quechua (official), Aymara
- Religions: Roman Catholic 90 %
- Government Type: Constitutional Republic
- Currency: 1 Nuevo Sol (S/.) = 3,28 Dollar (US$)
- Industry: mining of metals, petroleum, fishing, textiles, clothing, food processing, cement, auto assembly, steel, shipbuilding, metal fabrication
- Agriculture: coffee, cotton, sugarcane, rice, wheat, potatoes, plantains, coca; poultry, beef, dairy products, wool, fish
- Peru has the biggest biodiversity of the world
- Natural Resources: copper, silver, gold, petroleum, timber, fish, iron ore, coal, phosphate, potash, hydropower

NATIONAL METROLOGY SERVICE - (SNM - INDECOPI) - PERU

Address:

Calle De la Prosa 138

San Borja,

Lima 41- PERU

Tel. (++51-1) 224-7800- Anx 1331
Fax.(++51-1) 224-7800- Anx 1264

http://www.indecopi.gob.pe

NATIONAL METROLOGY SERVICE - (SNM - INDECOPI) - PERU

Law N° 23560 - 1983
SNM - ITINTEC
DS - 024 - 93 / ITINCI
SNM - INDECOPI

INDECOPI is accreditated with

ISO 9002 : 1994 since 1999

ISO 9001 : 2000 since 2001

NATIONAL METROLOGY SERVICE - (SNM - INDECOPI) - PERU

Laboratory of Mass was accreditated with the ISO 17025 : 1999 since 2003

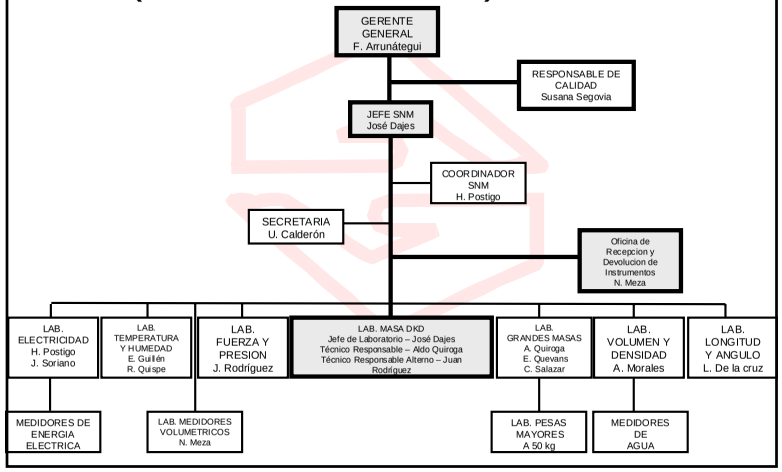
Deutscher Kalibrierdienst (DKD)

Physikalisch-Technische Bundesanstalt (PTB)

DAR registration number: DKD-K-35001

2003-01-13

NATIONAL METROLOGY SERVICE - (SNM - INDECOPI) - PERU



MEASUREMENT SYSTEM AND CURRENT SITUATION ABOUT THE MASS METERS IN PERU

•The legal units of Mass measurement in Peru is the kilogram (*kg).*

•The Technical and Commercial Regulations (CRT) with help the National Metrology Service (SNM) of INDECOPI regulated the implements and improved of the measurement laws.

MEASUREMENT SYSTEM AND CURRENT SITUATION ABOUT THE MASS METERS IN PERU

•The balances approval of type are not made in Peru, nevertheless in agreement with dispositions of the National Supervision of Tributary Administration (SUNAT) the calibrations of the balances in service are made every six months.

MEASUREMENT SYSTEM AND CURRENT SITUATION ABOUT THE MASS METERS IN PERU

•The calibrations of the balances in service are made by the National Merology Service (SNM) or Secondary Laboratories.

MEASUREMENT SYSTEM AND CURRENT SITUATION ABOUT THE MASS METERS IN PERU

Accuracy Class of balances in use in Peru according with OIML R 76 - 1992 :

•Special (Class II) Laboratory and Industry (5 g until 50 kg)

•High (Class I) Laboratory (5 g until 50 kg)

MEASUREMENT SYSTEM AND CURRENT SITUATION ABOUT THE MASS METERS IN PERU

Accuracy Class of balances in use in Peru according with OIML R 76 - 1992 :

•Ordinary (Class IIII) Commerce (5 kg until 1 000 kg)

•Medium (Class III) Industry (5 kg until 500 kg)

MEASUREMENT SYSTEM AND CURRENT SITUATION ABOUT THE MASS METERS IN PERU

The tests that are carried out for the all balances calibration according with OIML R 76 - 1992 are :

•Repeatability

•Histeresis

•Linearity

MEASUREMENT SYSTEM AND CURRENT SITUATION ABOUT THE MASS METERS IN PERU

•In its great majority High Capacity Weighing Machines up to 100,000 kg are calibrated in Peru (Medium Class according with OIML R76 - 1992)

MEASUREMENT SYSTEM AND CURRENT SITUATION ABOUT THE MASS METERS IN PERU

Also they carry out calibrations of :

•Highway weigh-in-motion (WIM) systems according with ASTM E 1318 : 2002 (500 kg up to 15,000 kg)

•Discontinuous totalizing automatic weighing instruments (totalizing hopper weighers) according with OIML R 107-1 : 1997 (1 kg up to 4,000 kg)

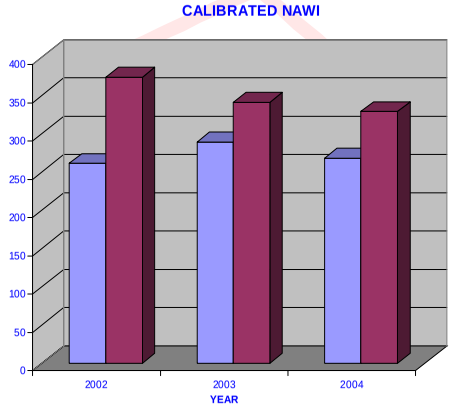
MEASUREMENT SYSTEM AND CURRENT SITUATION ABOUT THE MASS METERS IN PERU

Also they carry out calibrations of :

•Automatic catchweighing instruments according with OIML R 51 - 1 (0.5 kg up to 50 kg)

•Continuous totalizing automatic weighing instruments according with OIML R 50-1 : 1997 (1000 t/h up to 2,000 t/h)

MEASUREMENT SYSTEM AND CURRENT SITUATION ABOUT THE MASS METERS IN PERU



Thank you very much

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

Jakarta, Indonesia

September 12 to 16, 2005

Philippines Economy Report

- **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 towards 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 – 80 million

A1. Self Introduction

I am Mr. Gregorio Mendoza, a Science Research Specialist I working at the Mass Standards Section of the National Metrology Laboratory of the Industrial Technology Development Institute (ITDI); an agency of Department of Science and Technology (DOST) and already 20 years in service.

Brief_History:

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 of quantities such as mass, length, temperature, voltage and pressure; and the Science Act of 1958, pertaining to the test and analyses of products and materials and the calibration of weights and measures.

National Metrology Laboratory

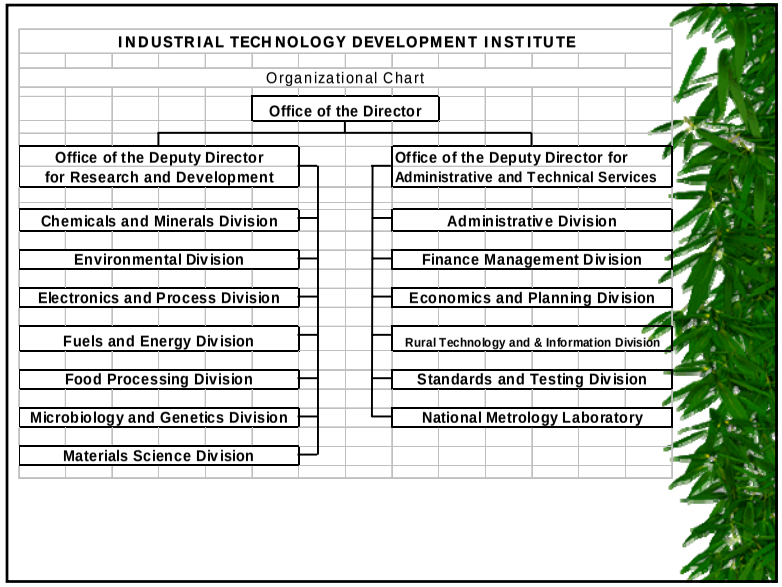
MISSION - - We shall establish and disseminate national standards of units and measurements to calibration laboratories and other sectors to provide international traceability to measurements done in the country. We shall do this by reliably conducting calibration and measurements at accuracy levels appropriate to the needs of the clients.

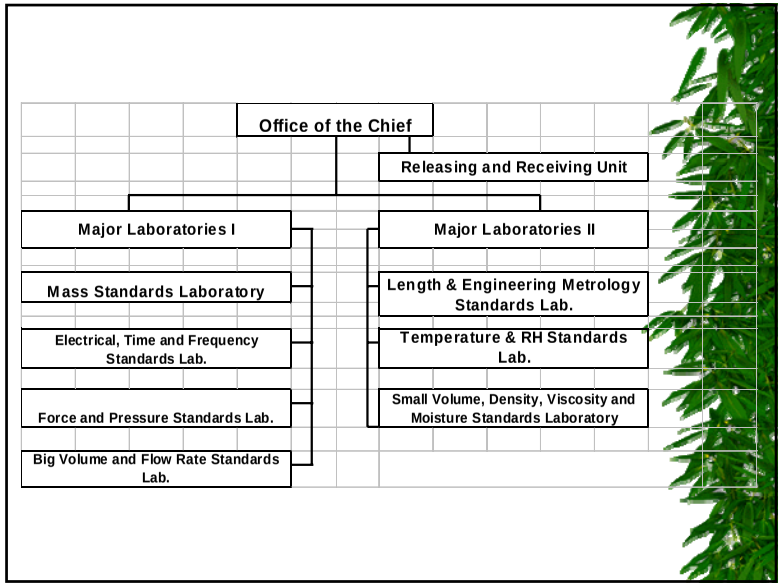
As national custodian for weights and measures, ITDI's program on metrology responds to the call for accuracy and traceability in the units of measurement (e.g. mass, length, volume) for product standardization, higher quality and competitiveness of local products, and protection of the consumers.

- *Describe specific activity*:
- My major task is on the calibration of standard weights (class F1 to M series) and weighing machines, from analytical/ precision balances, industrial and high capacity weighing machines (Accuracy class I, II, III, IV).
- At present, NML and other DOST Regional Offices (staff trained by NML) served the various sectors of the Region.

Present the following:

- Organizational structure of NML, and ITDI

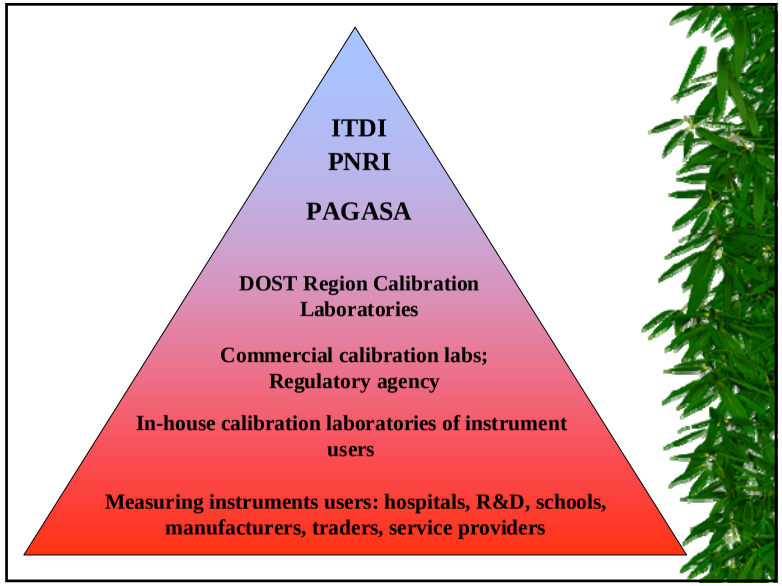




- *Show traceability chart*

From NML to Regional DOST to Cities and Municipalities (Legal Metrology)

From NML to Regional DOST- Industry-Service Providers-Suppliers-Academe



- *A2-1 Legal System in Your Economy*
- **Under the new law, the National Metrology Board which is composed of different department will implement the legal metrology based on their mandated tasks.**
- **For weighing machines, the NML are still doing the verification while, at the same time, giving training to local government unit Inspectors. The thrust of the NML is to train them first before the verification activities will be turned over to them.**

- *A2-2 Describe briefly the types of weighing instruments and its measuring range, which are covered by the measurement law)*
- The measurement law does not specify which are range are covered. In practice, for local government, the range is from 10 kg to 50 kg generally.
- The National Food Authority a regulatory body on rice, corn and other cereals covers a wide range of capacity (low to high capacity).

- *A2-3 Are initial verification and re-verification are required?*
- For those Inspectors who have undergone training by NML staff, these two activities are being followed.

- *A2-4 Do you have any problems in order to implement the legal metrology system?*
- As for anybody else, the budget is always the problem. It also follows the human resources.

- **A3 Non-Automatic Weighing Instruments**

- *A3-1 How many manufacturers of NAWI are there in your economy?*
- *If you know, please mention approximate size of the manufacturer(s) (number of employees, number of production,etc.?)*
- **Perhaps, one or three manufacturers (the employees are approximately 20 to 50). The products are more on mechanical weighing instruments. A few are digital weighing instruments being assembled. The applications are for industrial and commercial weighing. Productions ranges from 20 to 50 spring scales a day.**

- *A3-2 How many verifications and inspections are performed in a year in your economy?*
- The number of verifications are vague, but for sure the verifications activities are increasing due to the increasing demand for training.

- *A3-3 What are the major purposes or targets to use NAWI? What is the extent of electrical instruments occupied in all kinds of NAWI?*
- The NAWI produced are intended for industrial and commercial 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.

- *A3-4 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 and 100 kg to 100 t for Class III and Class IV.

- *A-4 Explain current situation in your economy about the compliance to the international standards, such as OIML R76?*
- The compliance to OIML R76 are not yet strictly followed. There are some standards which are still in used, especially for spring scales and platform scales (mechanical). For digital weighing instruments, many uses the OIML R76.

- *A5: Are there any other requirements from your economy?*
- There are no regulation yet that set the requirement. But the trend is to use the OIML R76 standards as much as possible. When the Implementing Rules and Regulation of the National Metrology Act of 2003 starts establishing technical procedures, that's the time it will adapt and modify international standards to suit the local conditions.

APEC/APLMF Training Courses in Legal Metrology Train the Trainer Course on the Verification of Non-Automatic Weighing Instruments

Introduction to the Bureau of Standards, Metrology and Inspection (BSMI) , Legal Metrology System and Non-Automatic Weighing instrument in Taiwan

CHUN-DER HSIA
Bureau of Standards, Metrology and Inspection (BSMI)
Ministry of Economic Affairs (MOEA)

➢Services Provided by the BSMI (1)

- ❑ Development and Promotion of National Standards
- ❑ CNS Mark Certification System
- ❑ **Verification and Inspection of Measuring Instrument**
- ❑ **Licensing and Management of Measuring Instruments Enterprises**
- ❑ **Type Approval of Measuring Instruments**
- ❑ **Calibration Service of Measurement Standards**
- ❑ Inspection of Commodities for Import
- ❑ Inspection of Commodities for Domestic Market
- ❑ Contracted Inspection

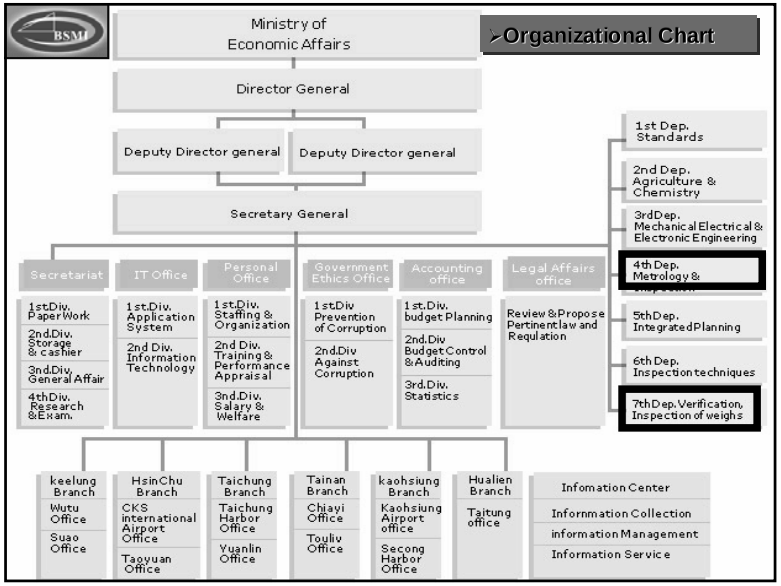
➢Services Provided by the BSMI (2)

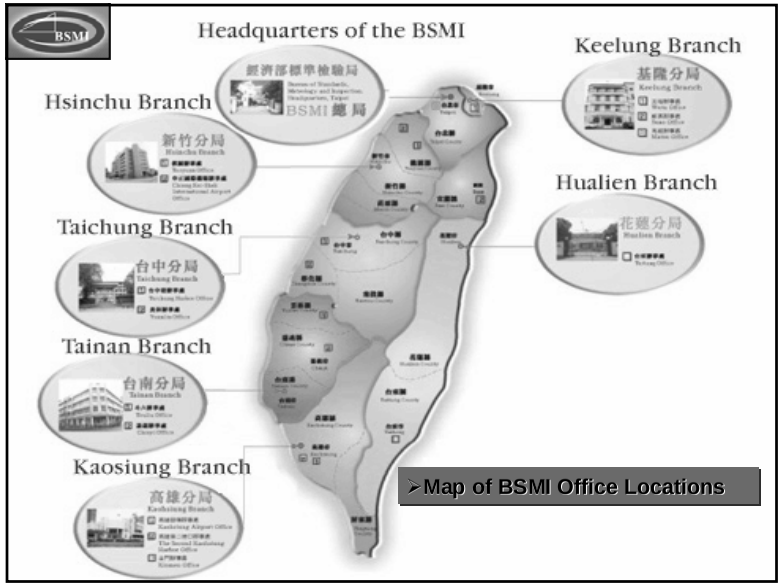
- ❑Commissioned test and other technical services
- ❑Voluntary Product Certification
- ❑Inspection Conducted by Designated Laboratories
- ❑Registration of Product Certification
- ❑Management System Certification

Remark:

- ✓ **The BSMI is the regulatory authority for legal metrology in Taiwan.**
- ✓ **I have been supervising and managing in National Metrology Institute (NMI) business for five years.**

➢Organizational Chart





➢Map of BSMI Office Locations

➢ **Main activities concerning legal metrology in the BSMI**

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

➢ **Laws on Legal Measuring Instruments**

- ❑ The Weights and Measures Act
- ❑ Enforcement Rules of Weights and Measures Act
- ❑ The Business Operation Licensing and Administration Regulations of Measuring Instrument Enterprises
- ❑ Regulations Governing Type Approval of Measuring Instruments
- ❑ Regulations Governing Verification and Inspection of Measuring Instruments
- ❑ Regulations Governing Commissioned Metrological Activities
- ❑ Regulations Governing Self-verification Conducted by Measuring Instrument Enterprises

Web Site: http://www.bsmi.gov.tw/english/law_index.htm

➢ **The Main Purposes to Use Legal Measuring Instruments**

❑In order to **ensure fair trade** and to **maintain proper public safety and health and environmental protection**, the competent authority may designate measuring instruments that are provided for use in trading transactions, certification, official inspection and testing, environmental protection, public safety, and medical and public health activities as legal measuring instruments.

➢ Administration of Weights and Measures Industry

- 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.

➢ Legal Measuring Instrument Enterprises in Taiwan

Enterprises	Number
manufacturers	201
repairers	118
importers	995

Including 106 Weighing Instruments

➢ Verification, Inspection of Legal Measuring Instruments in Taiwan

Year	Verification	Inspection
2000	2,184,671	133,835
2001	1,716,074	91,504
2002	2,231,881	85,534
2003	2,455,681	82,430
2004	2,435,072	87,278

➢ Management of Type Approval (1)

- The scope of electronic non-automatic weighing instruments subject to type approval are as follows:
  - Price-computing weighing instruments
  - Non-price-computing weighing instruments
    - ✓with maximum capacity of not less than 1kg and not more than100kg, and the number of verification scale interval 1,000~10,000.
    - ✓with a maximum capacity of less than 1kg or more than 100kg , or with a number of verification scale intervals less than 1,000 or more than 10,000, will be carried out from 1 January 2006.

➢ Management of Type Approval (2)

- ❑The term of validity of a type approval certificate is ten years. The expiration of the certificate will be issued after the BSMI has reviewed and approved.
- ❑If changes are intended to be made to the appearance, structure, material or technical characteristics of type-approved measuring instruments, an application shall be made for series type approval or approbation. However, if the changes resulted in great differences between the altered and the originally approved type, a new application for type approval shall be made.

➢ Management of Type Approval (3)

- ❑The regulation of tests of type approval for non-automatic weighing instruments is call " The technical regulation of type approval for non-automatic weighing instruments "(CNPA76). It is conforming to the OIML R 76.
- ❑The test of type approval for non-automatic weighing instruments is conducted by the Electrical Testing Center (ETC) which is qualified organizations assessed by the BSMI.

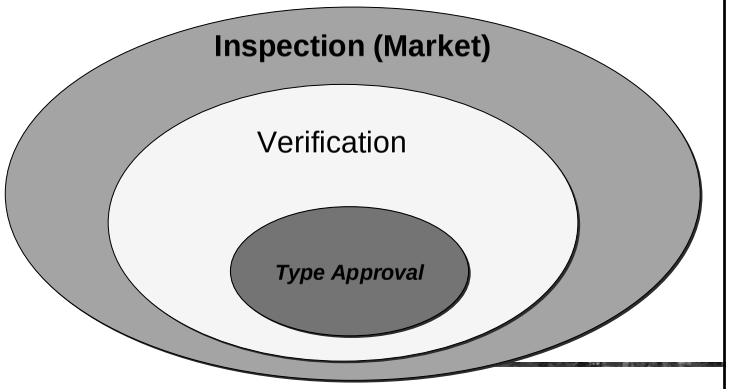
➢ Management of Verification (1)

- ❑The non-automatic weighing instruments subject to verification, excluding the following instruments:
  - ✓ Non-pricing weighing instruments with a number of verification scale interval all more than 10,000.
  - ✓ Suspended weighing instruments with a maximum weighing capacity of more than 1t.
  - ✓ Bathroom scales
  - ✓ Weighing in motion non-automatic weighing instruments.
  - ✓ Weighing instruments being marked not for transaction use.
  - ✓ Non-pricing weighing instruments with a weighing capacity under 2 kg and a number of verification scale interval under 200.

➢ Management of Verification (2)

- ❑The regulation of verification for non-automatic weighing instruments is call "The technical regulation of verification and inspection for weighing instruments" (CNMV76). It is conforming to the OIML R 76, and the tests are including the eccentricity, the weighing performance, and the discrimination.
- ❑Weighing instruments is verified and inspected by the 7th division and other branches of the BSMI.
- ❑All instruments that pass verification will be attached with a qualify sheet.

- **Relation of Type Approval, Verification and Inspection**



The End

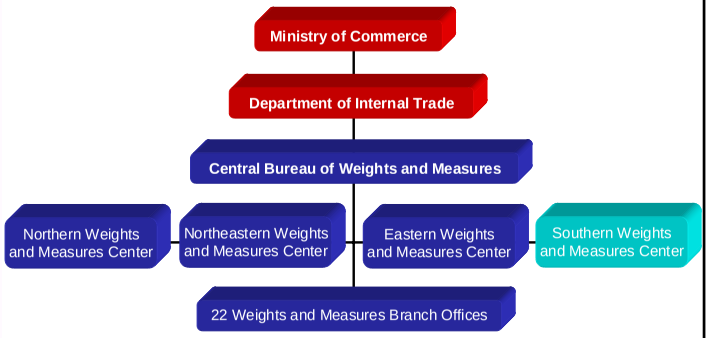
COUNTRY REPORT ON VERIFICATION OF NAWI. IN THAILAND

TRAIN THE TRAINER COURSE ON THE VERIFICATION OF NAWI.
IN JAKARTA,INDONESIA
SEPTEMBER 12-16, 2005

PRESENT BY
JARUN SANGTHONG

สำนักชั่งตวงวัด
Bureau of Weigths & Measures

Organization



LEGAL METROLOGY SYSTEM IN THAILAND

1. Weights and Measures Law B.E.2542 (1999)

- Unit
- Standards of Weights and Measures
- Weighing and Measuring instrument
- Verification
- Duties of the Weights and Measures Inspector
- Packaged commodities

LEGAL METROLOGY SYSTEM IN THAILAND

2. The regulation of characteristics of Measuring Instruments in control by Weights and Measures B.E.2542 (1999) B.E.2546 (2003)

- Type and Characteristics of all instruments
- Class of Weighing instruments
- Maximum permissible error
- Verification
- Seal

Class of NAWI. In Thailand

- According to OIML R 76

Class	e	n = max/e		Minimum capacity
		min	max	
I	0.001 g ≤ e	50,000	–	100 e
II	0.001 g ≤ e ≤ 0.05 g 0.1 g ≤ e	100 5,000	100,000 100,000	20 e 50 e
III	0.1 g ≤ e ≤ 2 g 5 g ≤ e	100 500	10,000 10,000	20 e 20 e
IIII	5 g ≤ e	100	1,000	20 e

Maximum permissible error of NAWI. In Thailand

- According to OIML R 76

Mpe.	Weight (m)			
	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

Range of NAWI. In Thailand

-All NAWI are under control Exempt for.

- Personal Scale
- Kitchen Scale

Initial verification and re-verification.

- It is not permitted for re-verification on Spring scale
- NAWI, which are permanently installed with the capacity from 20 t. and more must be re-verified every 2 years
- Other NAWI. must be re-verified after being repaired.

NAWI. In Thailand.

- In Thailand, there are 49 manufacturers of NAWI.
- They are small factories
- There are 10 - 50 employees
- The number of NAWI. Verification in 2005 are 600,000
- The number Increase is approximately 10 %
- NAWI. class III are commonly used.
- Capacity of truck scales 40 t. are common.

THANK YOU

VIETNAM METROLOGY INSTITUTE (VMI)

Laboratory of Mass

INTRODUCTION

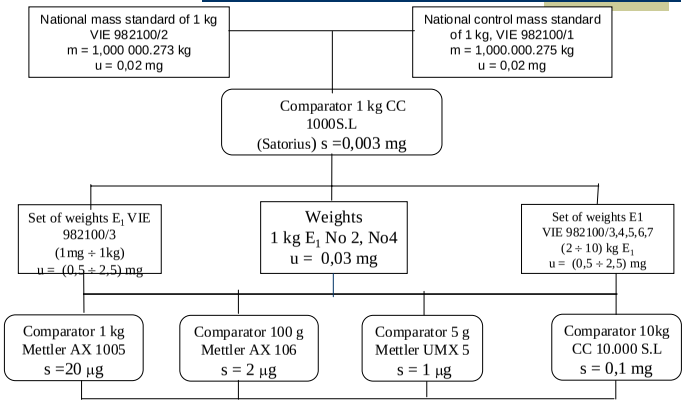
- To establish, maintain and custody national standard in the field of the mass measurement.
- To carry out calibration the mass standards and measuring instruments (weights of various accuracy class up to E_2 class (from 1mg to 10kg)).
- To carry out the metrological assurance program in industrial fields.
- To carry out other activities on mass measurement.

STAFF OF THE MASS LAB

From 1962 (at that time VMI was established) to present in mass laboratory there always are about 7÷8 persons. At this time, there are 7 persons in laboratory, their qualification are as following:

- 2 persons have master degree (in the field of physic and electronic),
- 3 persons have engineer degree (in the field of mechanical and electronic),
- Other persons are Technical.

Equipment



Calibration capability of the mass lab

No	Measuring instruments and standards		
	Measuring instruments & Standards	Measuring Range	Accuracy, uncertainty
1	Set of standard weights	1 mg - 10 kg	E_2
2	Set of standard weights	1 mg – 10 kg	F_1
3	Set of standard weights	1 mg – 20 kg	F_2
4	Set of standard weights	1 mg – 500 kg	M_1
5	Non-automatic weighing instruments	3 g – 150 t	Class 1,2,3, 4
6	Conveyor-belt scales	80 t/h – 1000 t/h	Class 1,2

Thank you