

# Singapore Weights and Measures Programme

## Information Booklet 2018

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# Enterprise Singapore

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## Section I: Introduction

### Chapter 1

#### 1.1 Preface

Having a uniform and accurate weights and measures system is important to all consumers and traders. As the national body for legal metrology, Enterprise Singapore regulates weighing and measuring instruments for trade, and net content of pre-packaged goods under the Act.

This **Information Booklet 2018** is the eighth edition on the Singapore Weights and Measures Programme. It serves as a guide for traders, repairers, installers, Authorised Verifiers (AVs), registered suppliers and meter-proving companies, on the requirements related to weighing and measuring instruments for trade use.

Enterprise Singapore welcomes feedback to ensure continuous improvements to this information booklet. Please send your feedback to:

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*While every effort is taken to present the information as accurately as possible, Enterprise Singapore shall not be held liable for any inaccuracy or omission in this publication. Enterprise Singapore reserves the right to amend and introduce new requirements to the Weights and Measures Programme.*

## 1.2 Overview of the Singapore Weights and Measures Programme

### Ensuring Fair Weights and Measures in Singapore

Enterprise Singapore ensures that a uniform and accurate system of weights and measures is used in Singapore, thereby ensuring fair trade and correct measurements for excise tax computation. Enterprise Singapore is responsible for the legal metrology of all weighing and measuring instruments used for trade, such as mass, length and volumetric measurements of food, fuel and other essential commodities including prepackaged goods.

#### What We Do

Enterprise Singapore's functions can be categorised under two broad areas:

- **Uniform and accurate system of weights and measures** in commercial transactions of goods such as sand, gravel, scrap metal, weighing of containers for the computation of freight charges and determining excise tax on fuel.
- **Fair weights and measures** at retail level to consumers.

To carry out its functions, Enterprise Singapore performs the following activities:

- Designating AVs (qualified private sector companies) of weighing and measuring instruments for trade use
- Ensuring that weighing and measuring instruments provided by AVs and registered suppliers are of approved patterns (types suitable for trade use), and meet the required standards
- Inspecting weighing and measuring instruments for trade use for inaccuracies and tampering
- Inspecting prepackaged goods or goods sold by weight or measure for short weight or measure
- Investigating complaints on weights and measures matters

## 1.3 What You Need to Know about this Programme

### Accurate and Uniform System for Traders and Consumers

Enterprise Singapore has a system of verification in place to ensure accurate weights and measures. This system uses uniform procedures when dealing with weighing and measuring instruments for trade use. The requirements ensure that the buying and selling of goods based on weights or measures are fair. It is thus important that all weighing and measuring instruments used are type approved, registered with Enterprise Singapore, and thereafter verified by AVs.

### Verification Seals

All new or repaired instruments which have been verified by AVs as accurate and fit for trade use are sealed either with the plastic verification seal or tamper-evident paper adhesive seals bearing the letters “RS” (Republic of Singapore) and Republic Shield with a verification number affixed as shown below.



Plastic seal



Tamper-evident paper adhesive seal

A weighing or measuring instrument will not be passed as fit for trade use if

- There are reasonable grounds to believe that the instrument is not suitable for that particular trade purpose
- It is not operating within the Maximum Permissible Errors specified for the prescribed instrument. Please refer to Appendix B of the Authorised Verifier Scheme Information Booklet 2018 (downloadable from [www.enterprisesg.gov.sg](http://www.enterprisesg.gov.sg)) on Key Sections of the Weights and Measures Act and Penalties for infringement.

## Unstamped or Unjust Instruments

If the seal is broken or an instrument is not accurate, the trader must immediately stop using the instrument. The instrument should be sent to an AV for verification. Please refer to Appendix B of the Authorised Verifier Scheme Information Booklet 2018 on Key Sections of the Act and Penalties for Infringement.

## Chapter 2

### 2.1 Weighing and Measuring Instruments for Trade Use

Examples of instruments prescribed for trade use are:

- (a) Flow meter
- (b) Fuel dispensing pump
- (c) Linear measure
- (d) Non-automatic weighing instrument

#### 2.1.1 Maximum Permissible Errors

The details of the Maximum Permissible Errors (MPE) for the instruments mentioned above are available in Appendix H of the Authorised Verifier Scheme Information Booklet 2018.

#### 2.1.2 Maintenance of Weighing and Measuring Instruments

Traders should ensure that their weighing or measuring instruments are

- Accurate at all times;
- Showing the spirit level with an air bubble resting in the center position;
- Zeroed before goods are weighed or measured;
- Cleaned and free from foreign particles on the weighing pan;
- Sent for annual verification to prevent short weights or measures;
- Affixed with the Weights and Measures verification seal at all times;
- Affixed with the Accuracy Label that is visible to consumers at all times; and
- Showing a visual reading to consumers for e.g. with the use of electronic dual-faced indicator type of instruments.

### 2.1.3 Disqualification (Cancellation) of Stamps

Where a stamp is marked or impressed on a weighing or measuring instrument, it shall be obliterated by use of a six-pointed star as illustrated below.



Stamps should be cancelled under the following circumstances:

- When any weight, measure, weighing or measuring instrument falls outside the MPE;
- When any weight, measure, weighing or measuring instrument has been damaged and cannot be adjusted properly;
- When there is evidence that the weighing or measuring instrument has been tampered with.

No person should use for trade, any weight, measure, weighing or measuring instrument in which the stamp has been cancelled.

### Notice Issued by Enterprise Singapore to Correct and Stamp Instrument

When appropriate, Enterprise Singapore may issue notices to any person or company in possession of any weighing or measuring instrument to be used for trade, requiring them to have the instrument tested, corrected and submitted for stamping within a specified period in the notice.

**Section II: Technical Requirements****Chapter 3****3.1 Registration of Approved Patterns of Weighing and Measuring Instruments**

Weighing or measuring instruments which are manufactured for use in trade must have in their instruction or operation manuals/leaflets, a statement advising users to seek approval from their national weights and measures authority before these instruments can be used for trade purposes.

Under Section 8 (1)(a) of the Weights and Measures Act, anyone intending to supply weighing or measuring instruments for use in trade, shall register the approved patterns before they can be used in Singapore. All new weighing or measuring instruments of types suitable for trade use must be submitted to Enterprise Singapore for approval. Enterprise Singapore approves and registers the patterns of weighing and measuring instruments used for trade in Singapore. Please refer to [Annex B for the Registration Process of Weighing and Measuring Instruments for trade use](#).

The following are some guidelines for completing the online Consumer Product Safety and Accuracy ([CPSA Application](#)) for the registration of weighing and measuring instruments:

**A. Company Information**

- (i) Name of the company applying for the approval and registration;
- (ii) Address of the company; and
- (iii) Name and designation of the person appointed by the company to be in-charge of submission of application as well as to liaise with Enterprise Singapore.

**B. Instrument Information**

- (i) Type of the instrument to be registered;
- (ii) Brand name/ make and identification/ designated type of the instrument;
- (iii) Maximum capacity and accuracy class of the instrument (state the various ranges of the instrument);
- (iv) Name of manufacturer;
- (v) International Organisation of Legal Metrology (OIML) Certificate of Conformity/ Pattern Evaluation Certificate Number;
- (vi) Certificate issuing body; and
- (vii) Pattern Evaluation/ Test Report Number.



**C. Ensure the following documents are attached**

- (i) Copy of the endorsed OIML Certificate of Approval/ Pattern Evaluation Certificate;
- (ii) Copy of the endorsed Pattern Evaluation/ Test Report(s);
- (iii) Circuit Diagram (block diagram is acceptable) of the power supply (supported with key component part list or descriptions);
- (iv) Photographs of external view, rating label/ markings and internal view with key components;
- (v) Weights and Measures Sealing Provision (supported with diagrams and/or photographs); and
- (vi) User or Service Instruction Manual (with safety and calibration/ adjustment instructions).

The metrological, technical and construction requirements for registration and approval, testing and examining procedures of weighing and measuring instruments are based on international practice established by OIML.

Enterprise Singapore may accept pattern approval certificates and test data issued by other national authorities, if it can be ascertained that the weighing or measuring instrument was tested in accordance with the relevant OIML recommendations.

Only weighing and measuring instruments with approved patterns registered with Enterprise Singapore, shall be verified and used for trade purposes in Singapore.

## Chapter 4

### 4.1 Verification of Weighing and Measuring Instruments

#### 4.1.1 Weighing Instruments

The annual verification of a non-automatic weighing instrument involves a process that ensures the instrument is functioning correctly and sealed to indicate any signs of tamper. This is to safeguard the interests of both consumers and traders. The AV or the user of the weighing instruments may use the following sequence of procedures based on the OIML R76 to verify or to inspect a weighing instrument already in service.

- Allow electronic instrument to warm up for about half an hour;
- Check the documentation and note if supplementary tests are required;
- Inspect instrument and make a note of the instruments metrological characteristics;
- Conduct a repeatability test. During the repeatability test for a mechanical instrument, check the accuracy of the zero-setting device;
- Conduct eccentric loading to check that the readings for the same load, when placed at various points of the instrument's weighing area, are within the MPE;
- Check the accuracy of zero setting;
- Determine the loads for the weighing test, then carry out the weighing test. You can combine the weighing test and discrimination test during one or more of the test loads during the weighing test;
- Conduct the tare setting test on electronic instruments;
- Conduct a price indication test during the weighing test; and
- Carry out any other test to complete the verification, or re-verification of instrument.

#### Verifying instruments greater than one tonne and use of standard weights

- When verifying instruments with maximum capacities greater than one tonne, additional weights may be used together with the standard weights.
- The standard weights could be one tonne or 50% of the maximum capacity (whichever is greater). Standard weights used must be verified - annually.
- Take for example the verification of a weighbridge with a maximum capacity of 40 tonnes, first 20 tonnes can comprise of standard weights (verified annually) and the remaining 20 tonnes can be made up of other constant weights.

### 4.1.2 Measuring Instruments

AVs are allowed to break the seals on oil dispensing pumps (i.e. fuel dispensers) to carry out repairs using the following procedure.

- Take three readings from each nozzle using a verified standard tank measure;
- Disconnect any metering unit(s) that are beyond the MPE;
- Padlock the pump after breaking the seal and keep the keys to prevent the operator from using the pump. A signboard/sticker is required to be displayed prominently to indicate the pump is under repair/service;
- The repairers or AVs will repair the pump. If repairers conduct the repairs, they need to arrange a verification appointment with an AV. One day before the appointment, the repairer must submit the break-seal report together with the last weights and measures stamping plates to the AV;
- Indicate the operator's name, location, pump number, pump product grade, weights and measures verification number and the pump volume totaliser reading (at the time of seal breakage) in the break-seal report; and
- Ensure that the repair/re-adjustment of the pump is carried out properly as only one adjustment is allowed during the verification by an AV. If the pump is found to exceed the MPE, it will be considered unfit for stamping and the repairer will have to arrange for another appointment with the AV.

### 4.1.3 Flowmeter Proving

All flowmeters should be verified or proved annually. This can be:

- Verified on site, with reference to a:
  - Prover loop or proving tank certified by an authorised meter proving company or AV, or
  - Master meter which for this purpose, is defined as a meter proved against a certified prover loop or proving tank using the same fluid (or one of similar viscosity and density).
- Proved in a calibration laboratory:
  - The verification of the flowmeter may be conducted either by gravimetric / volumetric method, or with a master meter, or other suitable methods, provided that the following requirements are met:
    - The uncertainty (at a 95% confidence level) in determining the error of the flow meter under test should not exceed one-third of the maximum permissible error to be applied;
    - The flow rate is not above the maximum or below the minimum level of operation;
    - Conducted within the normal operating range of pressure and temperature.

Subsequent meter proving period may be extended depending on actual operating constraints, and/or capabilities of local proving set-ups. Zero verification should be performed regularly till the next verification or proving.

### Accuracy

- For class 0.3 meters (such as meter systems in pipework and truck loading and terminal meters), the prescribed MPE is  $\pm 0.2\%$  of the measured quantity for initial verification and  $\pm 0.3\%$  of the measured quantity for in-service inspection.
- For class 0.5 meters (such as meters used generally for trade), the prescribed MPE for initial verification and in-service inspection is  $\pm 0.5\%$  of the measured quantity.
- Two or three points of test flow rates should be chosen within a specified flow range including a point of normal flow rate.
- At least three test runs for each test flow rate should be conducted.

### Repeatability

- For class 0.3 meters, three consecutive results must lie within a band of  $\pm 0.12\%$  of the measured quantity. Individual results must be within the MPEs stated above.
- For class 0.5 meters, three consecutive results must lie within a band of  $\pm 0.2\%$  of the measured quantity. Individual results must be within the MPEs stated above.

### Proving Standards

- All methods, procedures concerning calibration, facilities on *volumetric proving* should be in line with the international code of practice or any standards which are acceptable by Enterprise Singapore.
- All methods, procedures concerning calibration, facilities on *gravimetric proving* should be aligned with OIML or any standards which are accepted by Enterprise Singapore.
- Measuring instruments used for testing equipment for a custody transfer should be periodically calibrated by comparing with the following standards which are traceable to the international standards (Refer to table 1 and 2).

Table 1: Volumetric Standards

Type of volumetric standards	Validity of calibration
Proving tank (permanently in a fixed location)	Five years
Proving tank (portable, movable or mobile)	One year
Pipe prover or compact prover	One year
Master meter	One year

Table 2: Gravimetric Standards

Type of gravimetric standards	Validity of calibration
Mass standard (class E2)	Three years
Weighing balance	One year

Based on the reports issued, AVs will check and authorise the proving reports, issue verification certificates and affix seals or stamps and approve the meters as fit for trade use.

## **Chapter 5**

### **5.1 Contents of Prepackaged Goods (PPG)**

PPGs shall meet the following requirements with regards to their contents:

1. The average content of the packages in a lot shall not be less than the nominal quantity;
2. The number of non-standard prepackages (exceeding the tolerable deficiency as prescribed in table 2) in a sample taken from an inspection lot must not exceed the allowed number (c) as prescribed in Table 1; and
3. No pre-package shall have a negative error exceeding twice the tolerable deficiencies as prescribed in Table 2.

Table 1: Sample sizes and number of non-standard packages allowed

Number of packages in the lot of packages	Sample size	Number of of non-standard packages allowed (c)
from 0 to 100	All	0
from 101 to 500	50	3
from 501 to 3,200	80	5
More than 3,200	125	7

Table 2: Amounts of error for packages labelled by mas or volume

Declared quantity (g or ml)	Tolerable deficiency (T)	
	Amount of error (% of declared quantity)	Amount of error (g or ml)
from 5 to 50	9	-
51 to 100	-	4.5
101 to 200	4.5	-
201 to 300	-	9
301 to 500	3	-
501 to 1,000	-	15
1,000 to 10,000	1.5	-
10,000 to 50,000	-	150
More than 50,000	1	-

**Definitions****Accuracy**

The closeness between the result of the measurement and the true (conventional) value of the measured quantity.

**Adjustment**

Alteration of the measurement parameters to bring the dispenser within the allowable maximum permissible errors permitted when the dispenser is in use.

**Automatic weighing instrument**

Instrument that does not require the intervention of an operator during the weighing process.

**Content of a prepackage**

Actual quantity of product in a prepackage.

**Inspection lot (also called a batch)**

Definite quantity of prepackages produced at one time under conditions that are presumed to be uniform and from which a sample is drawn and inspected to determine conformance with specified criteria for acceptance or rejection of the inspection lot as a whole.

**Instrument**

Instrument as used in this Information Booklet, means a weighing and measuring instrument.

**Instrument test report**

Based on the performance of a module or a complete instrument and may or may not take into account the pattern approval specifications.

**Initial verification**

The verification of a new instrument, which does not bear the Weights and Measures verification mark.

**Load receptor**

The part of an instrument intended to receive the load.

**Mass**

The amount of matter of an object, regardless of location.

**Maximum Permissible Error (MPE)**

Maximum difference, positive or negative, allowed by regulation between the value indicated on an instrument and the corresponding true value. This is determined by reference standard weights when the instrument is at zero, with no-load and in the reference position.

**Non-automatic weighing instrument**

Instrument that requires the removal of the load from the weighing area of the weighing instrument during the weighing process. For example, to obtain the result by depositing on or removing the load to be measured from the weighing pan or platform.

**Nominal quantity ( $Q_n$ )**

Quantity of product in a prepackage declared on the label by the packager.

**Non-standard package**

A package enclosing goods that contains less than the quantity stated on the package or a label attached to it, where the deficiency is more than the amount of error prescribed (in table 2) but not more than twice that prescribed amount of error.

**Pattern of an instrument**

The definitive design of an instrument of which all the components affecting its metrological properties are suitably defined.

**Prepackage**

Combination of a product and the packing materials in which it is prepacked.

**Prepackaged good**

Single item for presentation as such to a consumer; consisting of a product and the packing material into which it was put before being offered for sale and in which the quantity of product has a predetermined value, whether the packing material encloses the product completely or only partially, but in any case in such a way that the actual quantity of product cannot be altered without the packing material either being opened or undergoing a perceptible modification

**Price-computing instrument**

Instrument that calculates the amount to pay on the basis of the indicated mass and the unit price.



**Repeatability**

The ability of an instrument to provide results which agree with each other when the same load is deposited several times and in a practically identified way on the load receptor under reasonably constant test conditions.

**Re-verification**

Any verification of a weighing or measuring instrument which follows the initial verification, because the seal/stamp is no longer valid due to conditions such as:

- Repairs or adjustment to the instrument
- The seal/stamp has been removed
- The user makes a request

The verification involves an examination of an instrument carried out by Enterprise Singapore or an AV with the aim of checking that the instrument has not been modified, and errors do not exceed the MPE permitted for re-verification.

**Sample size (n)**

Prepackages taken from an inspection lot and used to provide information that will serve as the basis for a decision on the conformance of the inspection lot.

**Stamping**

All operations for the purpose of applying to an instrument should indicate that it conforms to the requirements of verification and re-verification. It can be a stamp plug, a stamping label or a wire seal.

**Standard weight**

A mass which is verified against a reference standard weight, and is used to verify ordinary weighing instruments of a lower accuracy than itself.

**Tolerable deficiency (T)**

Deficiency in the quantity of product permitted in a prepackage.

**Verification**

The examination of an instrument by a Enterprise Singapore officer or an AV in order to indicate that the instrument conforms to the requirements outlined in this Information Booklet.

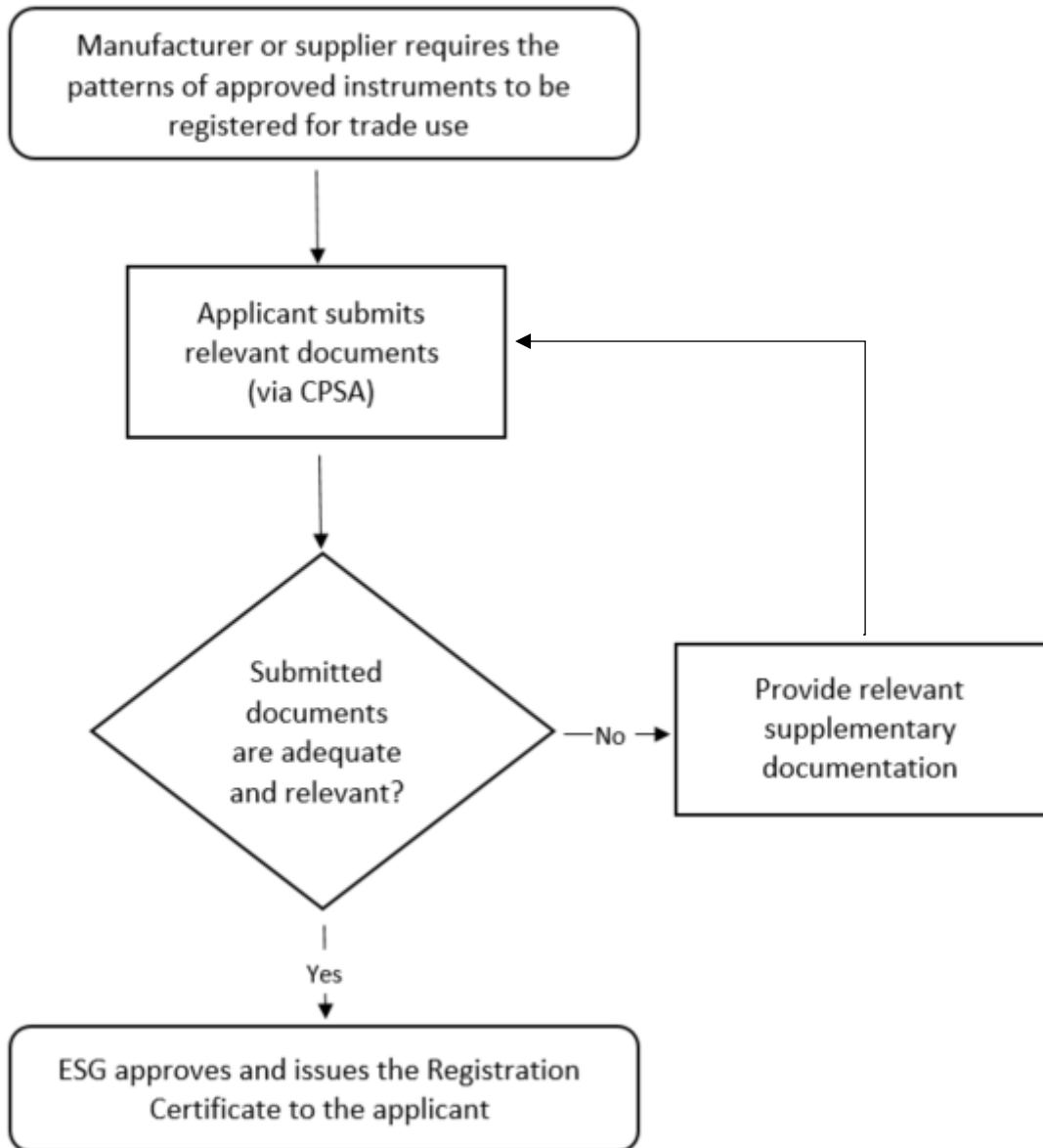
**Weighbridge**

A weighing instrument that is of a high capacity and has a platform through which the weighing instrument is capable of determining the mass of a vehicle on the ground.

### **Weighing instrument**

An instrument that serves to determine the mass of a body by using the action of gravity on this body. The instrument may also be used to determine other quantities, magnitudes, parameters or characteristics related to mass. According to its method of operation, a weighing instrument may be classified as automatic or non-automatic.

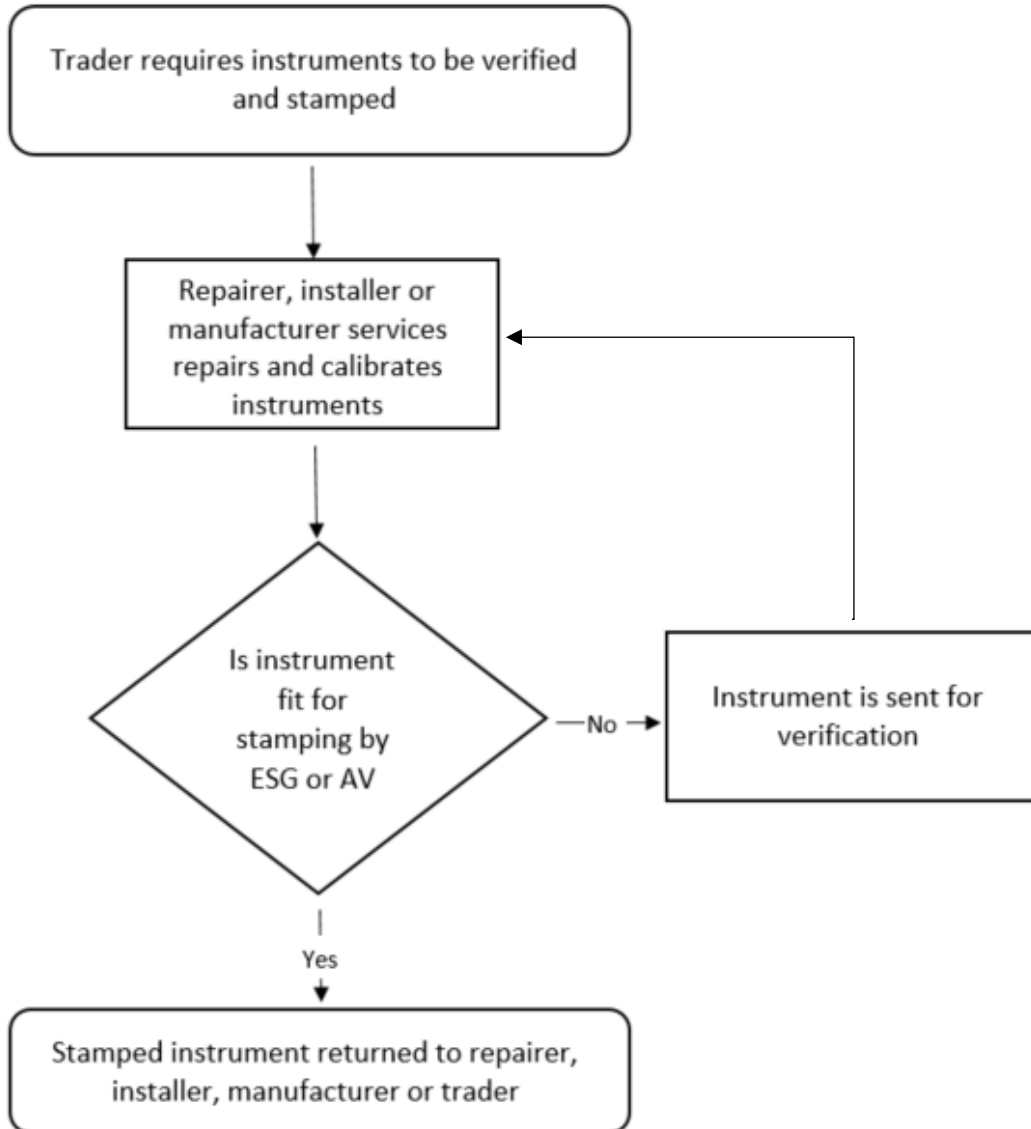
**Registration Process of Approved Patterns of Weighing and Measuring Instruments**



As the national body for legal metrology, Enterprise Singapore regulates weighing and measuring instruments for trade use to ensure fair transaction of goods and to protect the interests of both consumers and businesses.

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