

# Weights and Measures

Information Booklet

# **WEIGHTS AND MEASURES OFFICE**

© 2022 Enterprise Singapore

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The Weights and Measures Office (WMO) safeguards the interests of consumers and businesses by ensuring a uniform and accurate system of weights and measures in Singapore. The WMO is an office overseen by Enterprise Singapore.

Visit [www.weightsandmeasures.gov.sg](http://www.weightsandmeasures.gov.sg) for more information.

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## 1.0 Preface

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This information booklet serves as a guide to the **Weights and Measures Act** and its related regulations. Having a uniform and accurate weights and measures system is important to all consumers and traders. As the national body for legal metrology, the Weights and Measures Office (WMO) is an office overseen by Enterprise Singapore that is responsible for regulating weighing and measuring instruments for trade and the net content of pre-packaged goods under the **Weights and Measures Act**.

The WMO reserves the right to revise the booklet and introduce new requirements as and when the need arises.

Users are advised to obtain the latest version of this booklet from the website [www.weightsandmeasures.gov.sg](http://www.weightsandmeasures.gov.sg).

We appreciate any feedback so that improvements to this booklet could be made. Please send your feedback to:

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## 2.0 Introduction to the Weights and Measures Act

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### Ensuring Accurate Weights and Measures in Singapore

Accurate trade and measures are important to ensure consumers and businesses get what they pay for when buying goods that are weighed, measured, or pre-packed. The Weights and Measures Act assures fair trade by ensuring that a uniform and accurate system of weights and measures is used in Singapore. The WMO, as the implementer of the Act and its related regulations, is responsible for the legal metrology of weighing and measuring instruments used for trade<sup>1</sup>. This includes the mass, length and volumetric measurements of food, fuel and other essential commodities including pre-packaged goods.

To carry out its functions, the WMO performs the following activities:

- Designating **Authorised Verifiers (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 signs of tampering
- Inspecting pre-packaged goods or goods sold by weight or measure for short weight or measure
- Investigating complaints on weights and measures matters

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<sup>1</sup> Use for trade refers to transactions involving the transferring/ rendering of money's worth by reference to a certain quantity of goods exchanged, or where there is payment in respect of any toll or duty.

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We would like to draw your attention to the following sections of the Weights and Measures Act:

<b>Requirement</b>	<b>Penalty</b>
<u>Section 7(2)</u> Weighing or measuring instruments for trade use must be passed as fit for use, affixed with stamp and an Accuracy label	Liable on conviction to a fine up to \$2,000 and the weighing and measuring instrument forfeited.
<u>Section 14(1)</u> Weighing or measuring instrument shall not be false or unjust	Liable on conviction to a fine up to \$5,000 and/or imprisonment up to 3 months, and the weighing and measuring instrument forfeited.
<u>Section 18(1)</u> Units of measurement on any package, price list or advertisement for sale of goods shall be expressed as a unit of the Metric System	Liable on conviction to a fine up to \$2,000
<u>Section 19(1)</u> No person shall sell any goods by weight or other measurement or by number, deliver to the buyer a lesser quantity than that purported to be sold or than corresponds with the price charged.	Liable on conviction to a fine up to \$5,000 and/or imprisonment up to 3 months.
<u>Section 19(3)</u> No person shall sell or offer for sale any goods by weight, measure or number goods enclosed in a package that is lesser than the quantity stated on its package or label.	Liable on conviction to a fine up to \$2,000

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## 3.0 Key Aspects of the Weights and Measures Act

### 3.1 Weighing and Measuring Instruments for Trade Use

Examples of prescribed<sup>2</sup> instruments for trade use are:

Weighing instruments	Measuring instruments
<ul style="list-style-type: none"><li>- Non-automatic weighing instruments such as spring scales, electronic scales, weighbridges etc.</li></ul>	<ul style="list-style-type: none"><li>- Flow meters</li><li>- Fuel dispensing pumps</li><li>- Linear measures</li></ul>

### 3.2 Metric System of Units

Under the Weights and Measures Act, all transactions, advertisements, and/or displaying of goods for sale with reference to any weight or measure should use the metric system of units.

Below are examples of metric units commonly used in trade measurements:

Measurement by:	Weight	Volume	Length
Metric Units:	Kilogram, Gram, Milligram, Carat (metric)	Litre, Millilitre	Kilometre, Metre, Centimetre, Millimetre

For other metric units of measurement, refer to [First Schedule of the Weights and Measures Act](#), also appended in [Appendix B](#).

### 3.3 Verification Seals and Accuracy Labels

The verification system requires that weighing and measuring instruments for trade use in Singapore are **pattern approved**<sup>3</sup>, **registered with the WMO**, and thereafter **verified by AVs** for their accuracy. This ensures that buying and selling of goods based on weights or measures are accurate.

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;
- tamper-evident paper adhesive seals bearing the letters “RS” (Republic of Singapore) and Republic Shield with a verification number; or

<sup>2</sup> Prescribed weighing or measuring instruments are described in Regulation 3 of the Weights and Measures Regulations 2005

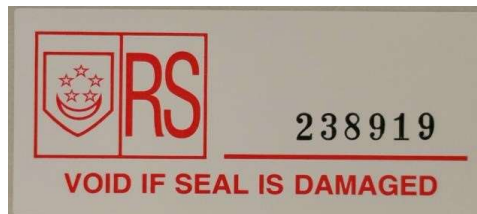
<sup>3</sup> Instrument that has been tested against a set of recognised standards to ensure it conforms to the requirements to be used for trade.

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- a cable-lock seal (used in specific industries only)



Plastic seal



Tamper-evident paper adhesive seal

and affixed with an Accuracy Label shown below.



Effective from 30 Nov 2021, verified weighing or measuring instruments for trade purposes will also be marked with a unique 7-digit instrument ID. This may take the form of a QR code label.



Unique Instrument ID  
First 2 digits: year of registration  
Last 5 digits: running number  
Number must tally with instrument ID during registration in CPSA+

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 (MPE)** specified for that prescribed instrument.

The ACCURACY Label is valid for 12 months. Subsequent re-verification of the weighing or measuring instrument is required thereafter ([Chapter 4.2](#)).



## Maximum Permissible Errors

The Maximum Permissible Errors (MPE) refers to the maximum difference between the indication of an instrument and the corresponding true value allowed by regulation. The details of the MPE for the instruments mentioned above are available in [Appendix C](#).

## 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.

## Disqualification (Cancellation) of Stamps

A six-pointed star is used to indicate the obliteration of a stamp that has been previously marked or impressed on a weighing or measuring instrument:



Stamps are 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 obliterated.

## **Notice Issued by the WMO to Correct and Stamp Instrument**

The WMO 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 submitted for verification within a specified period indicated in the notice.

## 3.4 Key points to note for weighing and measuring instruments

Traders shall ensure that their weighing or measuring instruments are:

- accurate at all times;
- zeroed before goods are weighed or measured;
- sent for periodic verification to prevent short weights or measures;
- affixed with the Weights and Measures verification seal at all times;
- affixed with a valid Accuracy Label at all times;
- situated such that a visual reading of the recorded or indicated weight or measurement of goods can be easily seen by the consumers e.g. with the use of electronic dual-faced indicator type of instruments.

Additionally, the weighing or measuring instruments should be:

- installed and used in suitable environmental conditions e.g. weighing scales should be used on level ground;
- cleaned and free from foreign particles on the weighing or measuring areas, e.g. weighing pan, dispenser nozzles.

## 4.0 Technical Requirements

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#### **4.1 Pattern registration of Weighing and Measuring Instruments**

Anyone intending to supply weighing or measuring instruments prescribed under the First Schedule of the Weights and Measures Regulations (refer to [Chapter 3.1](#) for examples) for trade use, must ensure the instrument is pattern registered with the WMO before it can be supplied for trade use in Singapore. Please refer to [Appendix D](#) for the Registration Process of Weighing and Measuring Instruments for trade use.

You may apply for pattern registration via the online form at <https://go.gov.sg/pattern-registration>. Please follow the instructions for how to complete the form and provide the necessary details and supporting documents as listed.

The metrological, technical and construction requirements for registration and approval, testing and examination procedures of weighing and measuring instruments are based on international practices established by International Organisation of Legal Metrology (OIML).

The WMO 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 that are pattern registered with the WMO, verified by an Authorised Verifier and affixed with an ACCURACY Label may be used for trade purposes in Singapore.

#### **4.2 Verification of Weighing and Measuring Instruments**

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To safeguard the interests of consumers and businesses, weighing and measuring instruments use for trade are required to go through periodic verification, and affixed with the ACCURACY label if it is found to be functioning within MPE. The ACCURACY Label is valid for 12 months. Past its validity, a re-verification of the weighing or measuring instrument is required to renew the ACCURACY Label.

Any person using a prescribed instrument for trade must submit the instrument to an appointed AV. This ensures that the instrument is functioning correctly and sealed, so that subsequent signs of tampering would be evident. Please refer to [Appendix E](#) for an overview of the Verification Process of Weighing and Measuring Instruments.

The detailed verification procedures for different types of weighing and measuring instruments are detailed in [Appendix F](#). If deemed fit for trade use after the verification is performed, the AV will affix the instrument with a stamp and an ACCURACY label.

## **QR code label and registration of weighing and measuring instruments in CPSA+**

Effective 30 Nov 2021, the WMO is launching a new system – the Consumer Product Safety and Accuracy System + or, “CPSA+”. CPSA+ replaces the previous CPSA which is an application website where AVs can submit verification records, as well as where the public registry of pattern registered instruments, list of designated AVs, etc. are hosted.

For more information about CPSA+ and how to use it, please refer to the CPSA+ guidebooks available at [www.cpsaplus.gov.sg](http://www.cpsaplus.gov.sg).

In addition to CPSA+, the WMO is also introducing a new QR code label (as shown in [Chapter 3.3](#)) which bears a unique 7-digit identification number (known as the instrument ID) that will help stakeholders to easily identify and track weighing and measuring instruments in CPSA+. The QR code label is to be affixed on instruments used for trade purposes.

Scanning the QR code will provide information such as when the instrument was last verified for accuracy. Consumers may also file a report to the WMO through scanning the QR code on the instrument for example, if instrument is not verified, not weighing or measuring accurately or even unfair trade practice(s) by the trader using the instrument.

AVs are to register the instrument in CPSA+ based on the unique identification number before submission of its verification test results in CPSA+.

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Should the instrument pass the verification and be deemed fit for trade use, AVs are to affix the ACCURACY Label right beside the QR code label or, in a position on the instrument easily seen by consumers.



Unlike the ACCURACY Label which is valid for 12 months, and has to be replaced prior to its expiry, the QR code label is permanent and should only be changed by an AV if it is found damaged or missing from the registered instrument.

As part of the registration process, AVs are to input information related to the instrument, such as the contact information of the instrument owner and its location. The information from instrument registration will help the WMO better track instruments used for trade purposes, ensuring better traceability and accountability of instrument owners.

## **Notifications from CPSA+**

The CPSA+ is able to send notifications to either inform on instrument updates or remind users that they have pending task(s) in CPSA+. Registered businesses, i.e., businesses with valid UEN, will receive these notifications via email. Businesses with no UEN will receive the notifications via SMS.

Instrument owners will receive the following type of notifications:

- List of instruments successfully registered by the AV in CPSA+
- List of instruments verified by the AV after its record has been successfully submitted in CPSA+
- A reminder that there are instruments due for re-verification in 2 months' time
- A reminder that there are instruments with lapsed ACCURACY Labels and to contact an AV for re-verification before they are used for trade
- Instrument ID of the registered instrument has been replaced

Note: As CPSA+ login is through CorpPass, only registered businesses with CorpPass may login to access their registered instruments in CPSA+.

## **4.3 Pre-Packaged Goods**

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Pre-packaged goods are goods enclosed in a packaging that are made up in advance for sale where the quantity of the product has been predetermined. This includes (i) pre-packages of the same kind and of the same stated quantity; and (ii) catchweight goods that are sold in varying quantities due to the nature of the goods.

Pre-packaged goods supplied within Singapore shall not be less than the quantity stated on the pre-package or label when offered or exposed for sale.

WMO inspectors conduct regular inspections on the content of pre-packaged goods. Inspectors are not obligated to inform businesses prior to any onsite inspections or surveillance activities. Businesses should cooperate and facilitate these surveillance activities when required.

The net quantity of pre-packed food products may be expressed in the following manner:

- Liquid foods – by volume
- Solid foods – by weight
- Semi-solid or viscous foods – weight or volume
- Food packed in liquid medium<sup>4</sup> by net weight of the food together with the liquid medium – drained weight of the food
- Glazed<sup>5</sup> frozen food – by weight, exclusive of the glaze

The net quantity of a pre-packaged good refers to the content of the product excluding any packaging materials such as, plastic wrappers and labels, ice glaze, absorbent pad and excess water etc.

Suppliers and/or retailers are encouraged to establish a system of controls or measures to ensure the accuracy of the net content of the pre-packaged good. This includes, but is not limited to, setting up of effective sampling, checking, and testing plans, or using only appropriate equipment for checks.

Suppliers and/or retailers of such pre-packaged goods should also ensure the net content is indicated using the metric system of measurement as mentioned in [Chapter 3.2](#) of this booklet.

## 5.0 Legislated Fees

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<sup>4</sup> Water, aqueous solutions of sugar and salt, fruit and vegetable juices in canned fruits and vegetables only, or vinegar, either singly or in combination.

<sup>5</sup> The application of a protective layer of ice formed at the surface of a frozen product by spraying it with, or dipping it into clean water

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Any person using a prescribed instrument for trade must submit the instrument to an appointed AV for regular verification. Instruments will be tested for its fitness for use for trade, then sealed and affixed with a valid Accuracy Label. This service rendered is chargeable and a part of it is paid to the WMO.

The Weights and Measures (Fees) Regulations have been in force since 1984, and several amendments have been made since to pass on savings from process improvements to businesses. The WMO is committed to ensuring that the process of ensuring accurate weighing and measuring instruments is as business-friendly and cost efficient as possible.

The corresponding revised fees (from 1 May 2020) for the services and applications are as shown in the table.

s/n	Fee Type	Fee (excl GST)
<b>Fees for AVs, Suppliers/Manufacturers of Instruments</b>		
1	<b>Pattern Registration</b> <i>Registration of instrument pattern for evaluation as fit for trade use (excludes verification fee payable to AVs)</i>	\$280
2	<b>AV Application and Renewal</b> <i>Apply to be an AV to conduct verification of instruments use for trade (renewable on an annual basis)</i>	\$500
3	<b>General Administration</b>	
A	- Certified true copy of an extract from the register (inclusive of GST).	\$31.50
B	- Duplicate appointment letters, certified true copy of an extract from the register relating to AV or pattern approval (inclusive of GST).	\$5.25

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# WEIGHTS AND MEASURES OFFICE

s/n	Fee Type	Fee (excl GST)
<b>Fees for Traders/Businesses Operating with Weights and Measures</b>		
4	<b>Linear Measure</b> <i>Service rendered by the WMO for the testing and/or passing as fit for trade use for the purpose of supply of the linear measure (with scale marks where the distance between are indicated in metric units of length).</i>	\$2
5	<b>Verification Report Submission</b> <i>Where the testing and/or passing of instrument as fit for trade is by an AV, the verification report is to be submitted and the fee payable to the Controller through the AV.</i>	
A	- Linear measure	\$2
B	- Liquid measure	\$3
C	- Flow meter and petrol pump	\$30
D	- Instrument with weighing capacity not exceeding 1 metric ton	\$3
E	- Instrument with weighing capacity exceeding 1 metric ton but not exceeding 30 metric tons	\$25
F	- Instrument with weighing capacity exceeding 30 metric tons but not exceeding 60 metric tons	\$500
G	- Instrument with weighing capacity exceeding 60 metric tons	\$1,000

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## **Appendix A – 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 pre-package**

Actual quantity of product in a pre-package.

### **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.

## **Pattern of an instrument**

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

## **Pre-package**

Combination of a product and the packing materials in which it is pre-packed.

## **Pre-packaged good**

Made up in advance for sale; 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 re-verification involves an examination of an instrument carried out by 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.

## **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.

## **Trade Use**

Use for trade refers to transactions involving the transferring or rendering of money's worth by reference to a certain quantity of goods exchanged, or where there is payment in respect of any toll or duty.

## **Verification**

The examination of an instrument by 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.

## **Appendix B – Metric Units System of Measurement**

Extracted from the [First Schedule of the Weights and Measures Act](#). Please refer to the online copy for the latest version.

### DEFINITIONS OF UNITS OF MEASUREMENT (METRIC UNITS)

#### PART I

##### Measurement of Length

Kilometre	=	1000 metres
Metre	=	The metre as defined under the Convention of the Metre 1875
Decimetre	=	1/10 metre
Centimetre	=	1/100 metre
Millimetre	=	1/1000 metre.

#### PART II

##### Measurement of Area

Hectare	=	100 ares
Dekare	=	10 ares
Are	=	100 square metres
Square metre	=	A superficial area equal to that of a square each side of which measures one metre
Square decimeter	=	1/100 square metre
Square centimeter	=	1/100 square decimeter
Square millimeter	=	1/100 square centimetre.

### PART III

#### Measurement of Volume

Cubic metre	=	A volume equal to that of a cube each edge of which measures one metre
Cubic decimeter	=	1/1000 cubic metre
Cubic centimeter	=	1/1000 cubic decimeter

### PART IV

#### Measurement of Capacity

Hectolitre	=	100 litres
Litre	=	1/1000 cubic metre
Decilitre	=	1/10 litre
Centilitre	=	1/100 litre
Millilitre	=	1/1000 litre.

### PART V

#### Measurement of Mass or Weight

Metric tonne	=	1000 kilograms
Quintal	=	100 kilograms
Kilogram	=	The kilogram as defined under the Convention of the Metre 1875
Hectogram	=	1/10 kilogram
Gram	=	1/1000 kilogram
Carat (metric)	=	1/5 gram
Milligram	=	1/1000 gram.

## Appendix C – Maximum Permissible Error of Weights

Extracted from the [Second Schedule of the Weights and Measures Regulations 2005](#). Please refer to the online copy for the latest version.

### MAXIMUM PERMISSIBLE ERROR UPON TESTING OF WEIGHING OR MEASURING INSTRUMENTS

#### MEASUREMENT OF LENGTH

Purported value	Length Measures	
	Testing and passing as fit for use for trade	Testing and passing as fit for use for trade
	End measure	Line measure
	Maximum permissible error in excess or deficiency millimeters	Maximum permissible error in excess or deficiency millimeters
1 centimetre	—	1
1 decimetre	—	1
1 metre	1	1
2 and 3 metres	2	2

*Notes:*

1. An end measure is a length measure which has the principal scale marks formed by 2 end surfaces or edges of the measure.
2. A line measure is a length measure which has the principal scale marks formed by 2 lines, holes or marks.

## MEASUREMENT OF VOLUME

### Capacity measures

Purported value							Testing and passing as fit for use for trade
							Maximum permissible error in excess or deficiency
							millilitres
1 millilitre	...	...	...	...	...	...	0.03
2 millilitres	...	...	...	...	...	...	0.06
5 millilitres	...	...	...	...	...	...	0.15
10 millilitres	...	...	...	...	...	...	0.3
20 millilitres	...	...	...	...	...	...	0.6
25 millilitres	...	...	...	...	...	...	0.75
30 millilitres	...	...	...	...	...	...	0.9
50 millilitres	...	...	...	...	...	...	1.5
100 millilitres	...	...	...	...	...	...	3
200 millilitres	...	...	...	...	...	...	6
250 millilitres	...	...	...	...	...	...	7.5
500 millilitres	...	...	...	...	...	...	15
1 litre	...	...	...	...	...	...	30
2 litres	...	...	...	...	...	...	60
2.5 litres	...	...	...	...	...	...	75
5 litres	...	...	...	...	...	...	150
10 litres	...	...	...	...	...	...	300
15 litres	...	...	...	...	...	...	450
20 litres	...	...	...	...	...	...	600
25 litres	...	...	...	...	...	...	750
30 to 300 litres	...	...	...	...	...	...	At the rate of 3% per litre

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### Oil dispensing pumps

	Testing and passing as fit for use for trade	In-service inspection
Quantity Delivered	Maximum permissible error in excess or deficiency	Maximum permissible error in excess or deficiency
	millilitres	millilitres
250 millilitres	0.75	1.25
500 millilitres	1.5	2.5
1 litre and above	At the rate of 0.3% per litre	At the rate of 0.5% per litre

### Flowmeters

	Testing and passing as fit for use for trade	In-service inspection	Repeatability
Accuracy Class	Maximum permissible error in excess or deficiency	Maximum permissible error in excess or deficiency	
0.3	0.2%	0.3%	0.12%
0.5	0.5%	0.5%	0.2%

#### Notes:

- The Accuracy Classes for flowmeters are as follows:
  - Class 0.3 refers to flowmeters used in pipework and includes truck loading and terminal meters; and
  - Class 0.5 refers to flowmeters for general use for trade.
- The percentages specified refer to the actual volume measured against the standard.



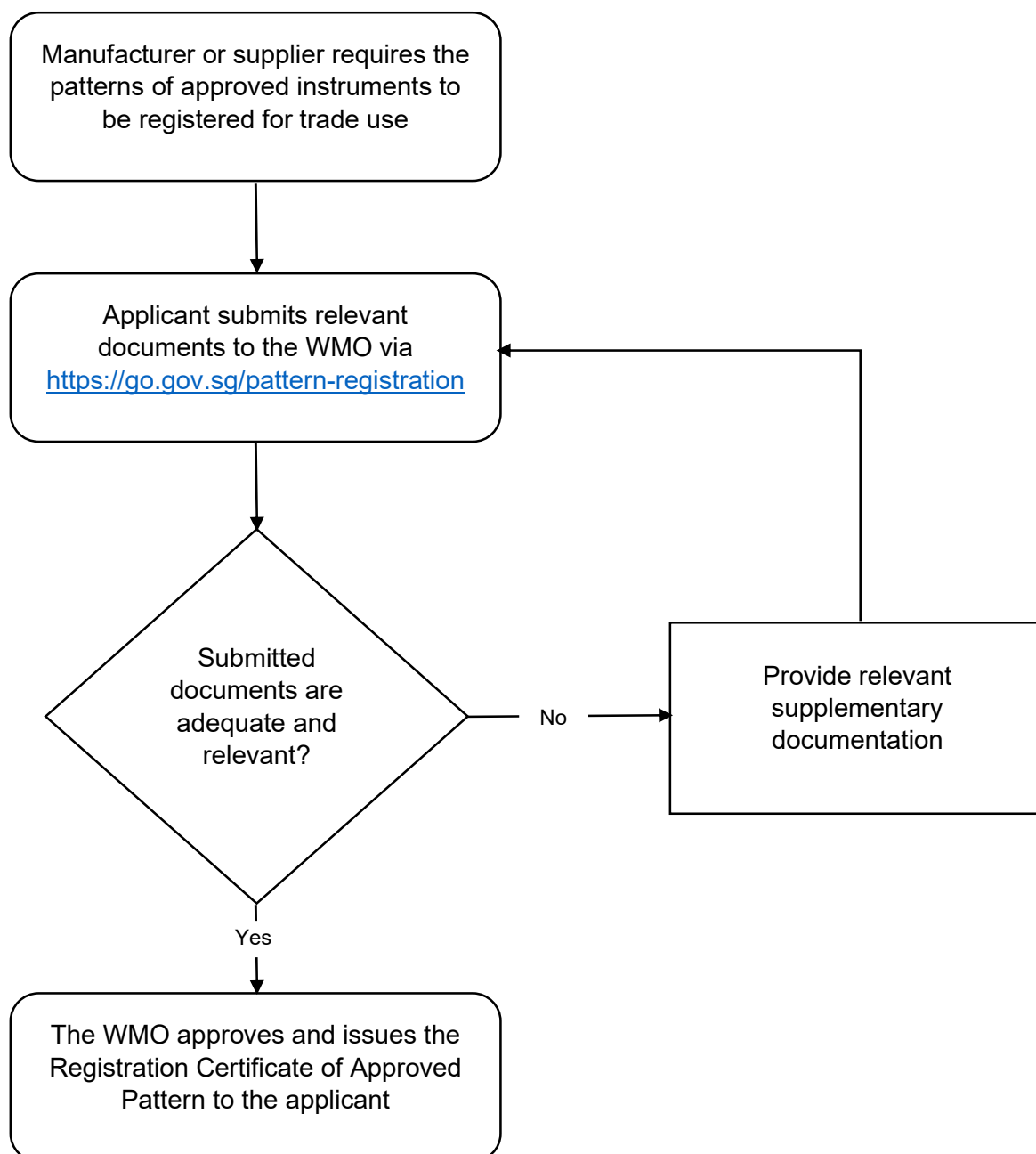
## WEIGHING INSTRUMENTS

Accuracy Class	Load (expressed in verification scale intervals, e)	Non-automatic weighing instrument	
		Testing and passing as fit for use for trade	In-service inspection
		Maximum permissible error in excess or deficiency (expressed in units of grams or kilograms depending on e)	
Class I	from 0 to 50,000	0.5(e)	1(e)
	over 50,000 up to 200,000	1(e)	2(e)
	over 200,000	1.5(e)	3(e)
Class II	from 0 to 5,000	0.5(e)	1(e)
	over 5,000 to 20,000	1(e)	2(e)
	over 20,000	1.5(e)	3(e)
Class III	from 0 to 500	0.5(e)	1(e)
	over 500 to 2,000	1 (e)	2(e)
	over 2,000	1.5(e)	3(e)
Class IV	from 0 to 50	0.5(e)	1(e)
	over 50 up to 200	1(e)	2(e)
	over 200	1.5(e)	3(e)

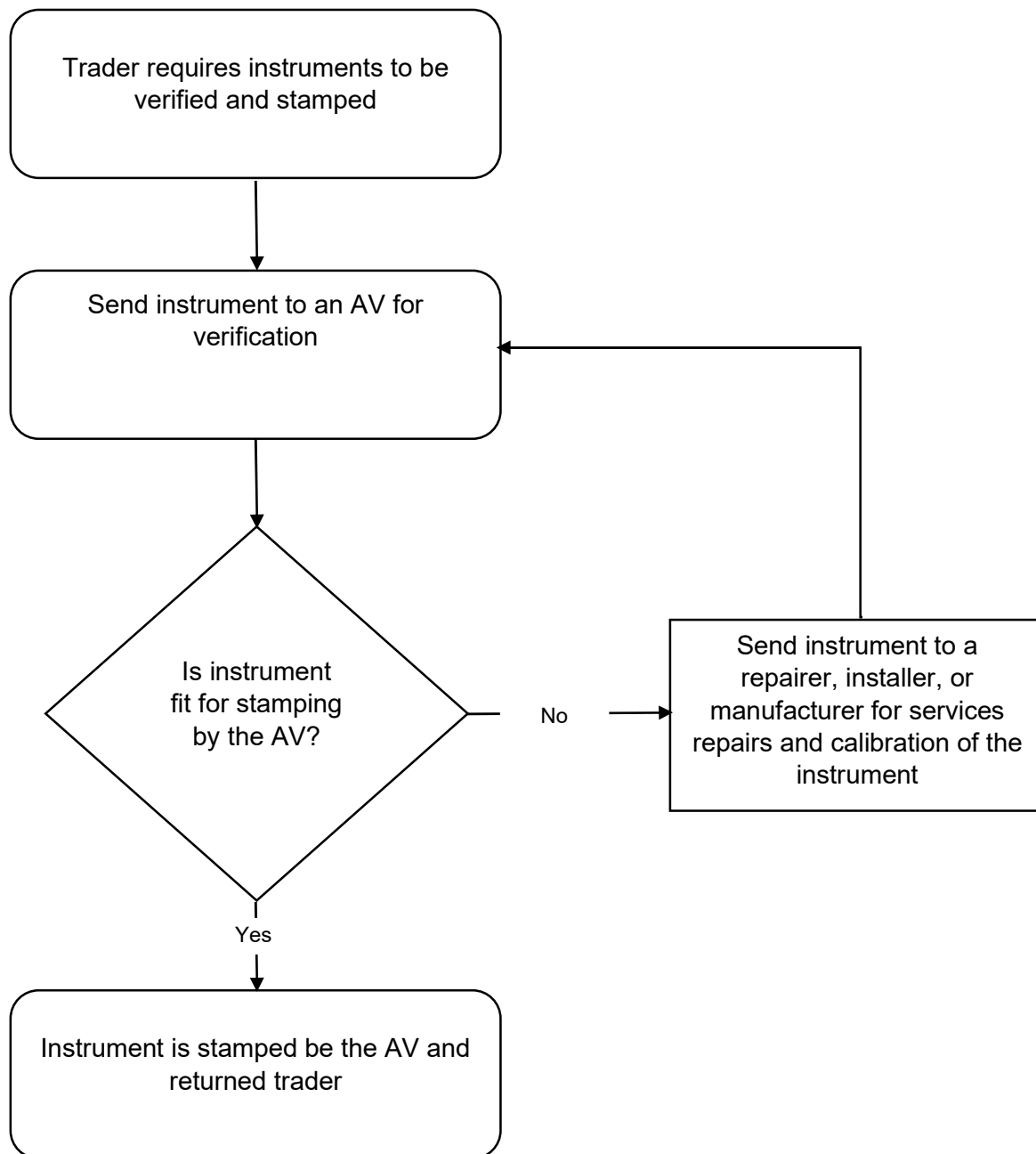
### Notes:

1. Load refers to a mass of known quantity applied to the load receptor for the purposes of testing or inspection.
2. e is the value, expressed in units of mass, of the scale interval used on the instrument.
3. The Accuracy Classes of non-automatic weighing machine are as follows:
  - (a) Class I refers to non-automatic weighing machines of special accuracy;
  - (b) Class II refers to non-automatic weighing machines of high accuracy;
  - (c) Class III refers to non-automatic weighing machines of medium accuracy; and
  - (d) Class IV refers to non-automatic weighing machines of ordinary accuracy.

**Appendix D – Registration Process of Approved Patterns of Weighing and Measuring Instruments**



**Appendix E – Verification Process of Weighing and Measuring Instruments**



## **Appendix F – Detailed verification procedures for weighing or measuring instruments**

### **Weighing Instruments**

**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.

### **Measuring Instruments**

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### **Oil dispensing pumps**

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

### **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.

For details on the requirements on accuracy, repeatability, and proving standards, refer to [Appendix G](#).

## **Appendix G – Accuracy, Repeatability, and Proving Standards for Flowmeter Proving**

### **Accuracy**

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- 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 the WMO.
- All methods, procedures concerning calibration, facilities on *gravimetric proving* should be aligned with OIML or any standards which are accepted by the WMO.
- 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 Tables 1 and 2 below).

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
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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.

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## Appendix H – Summary of Updates

No.	Chapter	Changelog (only main changes will be highlighted)
Updated May 2021		
1	N/A	Updated the office implementing the Weights and Measures Act and Regulations as the Weights and Measures Office.  Editorial changes to overall content including updating the website name from <a href="http://www.enterprisesg.gov.sg">www.enterprisesg.gov.sg</a> to <a href="http://www.weightsandmeasures.gov.sg">www.weightsandmeasures.gov.sg</a>
2	Appendix F and G	Previous Chapter 4 “Verification of Weighing and Measuring Instruments” moved to Appendix F and G.
Updated November 2021		
3	4.1	Updated weblink to new form for pattern registration
4	4.2	Updated information about CPSA+ and QR code label.  From November 2021, AVs are to register the instrument in CPSA+. Instrument owners and AVs will receive notifications from to inform on instrument updates and pending task(s) in CPSA+.
Updated November 2022		
5	4.3	Updated requirements for Pre-Packaged Goods
6	Appendix C	Updated the column for Load Intervals under the table for Non-Automatic Weighing Machines – Load intervals amended to be expressed in terms of verification scale intervals, e.