

	Technical Specification for Verification and Inspection of Liquid Volumetric Meters		S/N	CNMV 45										
			Rev.	1										
1. This Technical Specification is developed pursuant to Paragraph 2, Articles 14 and 16 of the Weights and Measures Act. 2. The date of promulgation, document number, date of enforcement and content of amendment are listed as follows: <table data-bbox="272 573 1382 719"> <thead> <tr> <th>Rev.</th><th>Date of Promulgation</th><th>Document No. (Ching-Piao-Szu-Tsu)</th><th>Date of Enforcement</th><th>Content of Amendment</th></tr> </thead> <tbody> <tr> <td>1</td><td>29.05.2003</td><td>No.09240005130</td><td>01.07.2003</td><td></td></tr> </tbody> </table>					Rev.	Date of Promulgation	Document No. (Ching-Piao-Szu-Tsu)	Date of Enforcement	Content of Amendment	1	29.05.2003	No.09240005130	01.07.2003	
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NO GUARANTEE ON THE TRANSLATION

In case of discrepancies between the English translation and Chinese text, the Chinese text shall govern.

1. Scope: this specification applies to metal measuring buckets and measuring tanks subject to verification and inspection, marked with graduation lines (hereinafter referred to as "liquid volumetric meters"), excluding the following measuring tanks:
 - (1) Measuring tanks with a capacity of more than 110 m³ and marked with graduation lines.
 - (2) Pressure measuring tanks.

2. Construction

- 2.1 Liquid volumetric meters are classified by capacity. A liquid volume with a capacity of not more than 50L is called a measuring bucket; a liquid volumetric meter with a capacity of more than 50L is called a measuring tank.
- 2.2 A liquid volumetric meter shall be marked with the following items clearly:
 - (1) Instrument number.
 - (2) Capacity.
 - (3) Manufacturer's name or trademark.
- 2.3 The graduation lines, numbers and other markings of a liquid volumetric meter shall be correct, obvious and hard to be erased.
- 2.4 The materials of a liquid volumetric meter shall be resistant to corrosion.
- 2.5 A liquid volumetric meter shall be free of leakage or deformation during use.
- 2.6 The standard capacity of a liquid volumetric meter shall be measured at 20 °C. However, if the measured liquid is a petroleum product, it shall be measured at 15 °C.
- 2.7 A standard liquid volumetric meter shall be provided with a leveling device.
- 2.8 The graduation lines of a liquid volumetric meter shall be horizontal at measurement.
- 2.9 The main graduation lines of a standard measuring tank shall be marked with scale intervals.
- 2.10 The graduated scale of a liquid volumetric meter shall be made of materials with a small coefficient of linear expansion. The meter body and the dedicated graduated scale shall be marked with the same instrument number.
- 2.11 The glass liquid level gauge used in a liquid volumetric meter shall be able to endure a temperature of 50 °C higher than the ambient temperature. It must be free of air bubbles, veins, sags and crests, or any other defect that will affect the measurement.
- 2.12 If the full capacity of a liquid volumetric meter overflows, the edge of the volumetric meter shall be flat and smooth.
- 2.13 The buoy of a buoy type liquid volumetric meter shall move smoothly when rising or sinking on the liquid surface.
- 2.14 The minimum scale intervals of a standard measuring tank used in a liquid flow meter shall be as prescribed in Table 1:

Table 1

Full Capacity	Minimum Scale Intervals
Not more than 500 L	Not more than 1 L
More than 500 L	Not more than 1/500 of the full capacity

2.15 For a liquid volumetric meter with a capacity adjusting device, the capacity must not be adjusted after lead sealed.

3. Verification, Inspection and Maximum Permissible Errors

3.1 Verification and inspection equipment: certificates of traceability and uncertainty shall be provided.

(1) Standard measuring bucket (used in the comparison method):

Capacity: 5 L, minimum scale intervals of not more than 1 mL;

Capacity: 10 L, minimum scale intervals of not more than 2 mL;

Capacity: 20 L, minimum scale intervals of not more than 5 mL.

(2) Standard measuring tank (used in the comparison method):

Capacity: 100 L, minimum scale intervals of not more than 0.05 L;

Capacity: 200 L, minimum scale intervals of not more than 0.1 L;

Capacity: 500 L, minimum scale intervals of not more than 0.2 L.

(3) Standard weighing instrument (used in the weighing method).

(4) Standard densimeter (used in the weighing method).

(5) Thermometer: 0 °C to more than 50 °C, with minimum scale intervals of not more than 1 °C.

3.2 After rubbing the markings, graduation lines and graduated scale of a liquid volumetric meter with a piece of wet white cloth for 10 times, the cloth shall not bear the color of markings, graduation lines or graduated scale.

3.3 The indication error of a liquid volumetric meter shall be verified with water at an ambient temperature, unless the volumetric meter has been filled with another liquid.

3.4 Verification of a liquid volumetric meter shall be conducted after an adjustment of the level. However, it may be conducted under original conditions if the meter is installed at a fixed position.

3.5 To verify a liquid volumetric meter using the comparison method or the weighing method, the indication error shall be calculated by subtracting the actual volume from the indicated volume on the volumetric meter tested:

3.5.1 Comparison method: fill liquid from the standard measuring bucket (or tank) into the volumetric meter to be tested, or fill liquid from the volumetric meter to be tested into the standard measuring bucket (or tank) to measure the indication error. Then calibrate the volumetric meter based on the indication error of a standard measuring instrument.

3.5.2 Weighing method: measure the mass and density of the liquid in the volumetric meter to be tested with a standard weighing instrument and a

standard densimeter; calculate the actual volume with the formula as follows:

$$Q = \frac{W}{d - 0.0011}$$

Q : actual volume (L).

W : The reading of the standard weighing instrument (kg).

d : density of the liquid (g/cm³).

3.6 The maximum permissible errors of verification of liquid volumetric meters can be positive or negative:

- (1) Maximum permissible errors of verification of measuring buckets are as prescribed in Table.2.

Table 2

Full Capacity	Maximum Permissible Errors
Not more than 10 L	1/250 of the full capacity
More than 10 L	1/400 of the full capacity

- (2) Maximum permissible errors of verification of measuring tanks are 1/200 of the indicated values on measuring tanks.
- (3) Maximum permissible errors of standard liquid measuring buckets shall be not more than 1/2 of the values prescribed in Table 2.
- (4) Maximum permissible errors of standard measuring tanks are 1/200 of the indicated values on measuring tanks.

3.7 For the measuring tank passed in verification, a verification conformity certificate shall be issued and provides the following information:

- (1) Instrument number.
- (2) Capacity.
- (3) Length, width and height of the measuring tank.
- (4) Height and caliber of water inlet.
- (5) Height of liquid level.

3.8 The maximum permissible error of inspection of a liquid volumetric meter is 2 times the maximum permissible error of verification.

4. Verification compliance marks

4.1 The place of verification compliance mark of a measuring bucket or a measuring tank shall be on the upper right side of the full capacity marking.