	Technical Specification of Verification and Inspection for Water Meters	S/N	CNMV 49
		Rev.	4

1. This Technical Specification is enacted 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:

Rev.	Date of Promulgation	Document No. (Ching-Piao-Szu-Tsu)	Date of Enforcement	Content of Amendment
1	2003-03-18	No. 09240002620	2003-04-01	
2	2005-03-25	No. 09440001090	2005-04-01	Added the dynamic test method by referring to CNS 14866
3	2008-06-25	No. 09740003350	2008-07-01	Revised as per CNS 14866
4	2015-12-23	No. 10440018050	2016-07-01	1.Amending the terms amd definition to harmonize with the technical specification for type approval. 2.Adding the minimum water volume for verification and inspection for vortex water meters. 3.Specifying the maximum useable span 8 years for water meters with meter designation N < 15 or nominal size not greater than 40 mm and no subsequent verification for those water meters passed the maximum useable span.

3. The technical specifications are laid down by referring to the national standards below:

CNS 14866-1 Measurement of water flow in closed conduits – meters for cold potable water—part 1: Specifications （10/20/2004）

CNS 14866-2 Measurement of water flow in closed conduits – meters for cold potable water—part 2: Installation requirements and selection（10/20/2004）

CNS 14866-3 Measurement of water flow in closed conduits – meters for cold potable water—Part 3: Test methods and equipment（10/20/2004）

CNS 13979 Vortex flow meter（08/21/2007）

Date of Promulgation	Bureau of Standards, Metrology and Inspection Ministry of Economic Affairs	Date of Enforcement
2015-12-23		**2016-07-01**

1. Scope: This technical specification applies to volumetric, velocity meters (Woltmann meters, single-jet and multi-jet meters), and vortex water meters, but excludes the meters with nominal diameter greater than 300 mm.

2. Definitions

2.1 Volumetric meter: Device, fitted into a closed conduit, which consists of a chamber of known volume and a mechanism driven by water flow, whereby these chambers are successively filled with water and then emptied. By counting the number of these volumes passing through the device, the indicating device totals the volume flow.

2.2 Velocity meter: Device, fitted into a closed conduit, consists of a moving element set in motion directly by the velocity of the water flow. The movement of the moving element is transmitted by a mechanism or other means to the indicating device that totals the volume of water passed.

2.2.1 Woltmann meter: Device consists of a helical blade that rotates around the axis of flow of water in the meter.

2.2.2 Single-jet meter and multi-jet meter: Device consists of a turbine rotor that rotates about the axis perpendicular to the flow of water in the meter. The meter is called a single-jet meter if the jet impinges at a single point on the turbine rotor's periphery and a multi-jet if the jet impinges simultaneously at several points around the periphery of the rotor.

2.3 Vortex flow meter: Devices comprising a bluff body in the water flow to detect the vortices frequency after the bluff body continuously and integrating an indicator which total the volume flow.

2.4 Flow-rate: The quotient of the volume of water passing through the water meter and the time taken for this volume to pass through the water meter. The flow-rate is expressed in cubic meters per hour (m^3/h).

2.5 Permanent flow-rate, q_p: Applying to volumetric and velocity meters only, flow-rate at which the meter is required to operate in a satisfactory manner under normal conditions to use, e.g. under steady and/or intermittent flow conditions.

2.6 Maximum flow-rate, q_{max}: Applying to vortex meters only, the maximum flow-rate that the meter still be able to measure the volume of water precisely and the error of the indicating not over the maximum permissible errors.

2.7 Overload flow-rate, q_s: Applying to volumetric and velocity meters only, flow-rate at which the water meter is required to operate in a satisfactory manner for a short period of time without deteriorating. Its value is twice the value of q_p.

2.8 Minimum flow-rate, q_{min}: Applying to volumetric and velocity meters only, lowest flow-rate at which the meter is required to give indications within the maximum permissible error. It is derived from the relationship of the numerical value of the meter designation.

2.9 Flow-rate range: To volumetric and velocity meters only, range limited by the overload flow-rate, q_s and the minimum flow-rate, $q_{min,}$ in which the error of the indication of the meter must not exceed the maximum permissible errors. The range is divided into two zones called "upper" and "lower" zones, respectively, separated by the transitional flow-rate, to vortex meters, range limited by the maximum flow-rate, q_{max}, and the minimum flow-rate, q_{min}.

2.10 Transitional flow-rate, q_t: Applying to volumetric and velocity meters only, flow-rate, occurring between overload and minimum flow-rates, at which the flow-rate range is divided into two zones, the "upper zone" and "lower zone", each characterized by a maximum permissible error respectively.

2.11 Large flow-rate, q_a: Applying to vortex meters only, the flow-rate using for the verification on vortex meters with faster velocity of water flow, equaling to the three-fifths of maximum flow-rate, q_{max}.

2.12 Small flow-rate, q_b: Applying to vortex meters only, the flow-rate using for the verification on vortex meters with slower velocity of water flow, equaling to the one-fifths of maximum flow-rate, q_{max}.

2.13 Nominal size, DN: Numerical designation common to all the components of a pipe system, excluding those designated by the external diameter or by the thread dimension. It is a whole number used for reference only, approximating the constructional dimensions.

2.14 Pressure loss: Pressure loss caused by the presence of a water meter in the pipeline at a given flow-rate.

2.15 Meter designation, N: Applying to volumetric and velocity meters only, numerical value, which is preceded by the capital letter N, to designate the meter in relation to tabulated values of dimensions.

2.16 Indicating device: Device displaying the flow volume.

2.17 Nominal pressure, PN: Numerical designation which is a rounded number for reference purposes. All equipment of the same nominal size (DN) and designated by the same PN number shall have compatible connecting dimensions.

3. Construction

3.1 The measurement unit of the meter is "cubic meter", and its symbol is "m^3".

3.2 The following items shall be clearly marked on water meters.

(1) The serial number shall be clearly marked.

(2) The model number shall be clearly marked for easy scrutiny on the indicating device.

(3) The direction of flow (↓) shall be marked on both sides of the meter.

(4) The nominal size shall be marked on the center of the surface of the lid and the side of the meter.

(5) Indicator range and numbers of volumetric and velocity meters (the maximum volume of dial measurement) shall be marked on the indicating device as shown in table 1. The maximum dial measurement volume and numbers of vortex flow meters shall be marked on the dial measurement display as shown in table 2.

(6) Name or trademark of the manufacturer shall be marked on the side of the meter or indicating device.

(7) The expired date of verification shall be marked on the edge of the upper outer case.

(8) Type approval number shall be clearly marked for easy scrutiny on the indicating device, but this does not apply to those not subject to type approval.

(9) The direction of installation (V or H) shall be marked on both sides of the meter or indicating device, but this does not apply to vortex flow meters.

(10) For those with price indicating device, the unit price and the units of total amount in the price indicating structure shall be clearly marked for easy scrutiny on the meter.

(11) Metrological classes of volumetric and velocity meters, meter designation (N), nominal pressure (PN), pressure loss (in Pa as the unit), meter designation (N) as well as flow-rate q_p if the permanent flow-rate q_p is not equal to the value of meter designation (N).

3.3 Small meters with a meter designation $N \leq 15$ or nominal size smaller than 50mm are not allowed to be coated, however, large meters with a meter designation $N \geqq 15$ or nominal size greater than 50mm shall be coated with rust proof paint or powder on inside and outside of the outer case as regulated in CNS4930, CNS13273 or other related national standards.

3.4 Materials:

3.4.1 Materials used for volumetric and velocity meters:

3.4.1.1 Water temperature variations, within the working temperature range, shall not deteriorate the materials of the water meter.

3.4.1.2 All materials of the water meter contacting the water passing the water meter shall be non-toxic and non-tainting.

3.4.1.3 The use of the materials shall comply with active national standards.

3.4.1.4 All the material of water meters shall be able to resist the expected corrosion occurred at internal or external of water meters. Otherwise, proper surface-treatment could be needed to protect the water meters.

3.4.1.5 The water meter shall be made of materials with necessary strength for the purpose it is to be used.

3.4.1.6 The indicating device of the water meter shall be protected by sight glass (glass or other material). Further protection may be provided by a suitable lid.

3.4.1.7 If condensation occurred inside the sight glass of the indicating device, the condensation shall be able to be removed from the sight glass.

3.4.2 Materials used for vortex flow meters:

3.4.2.1 In principle, the water meter shall be made of stainless steel or other stainless, anti-corrosion, durable materials. Meanwhile, the materials shall no not affect water quality, and shall be able to resist to chlorine.

3.5 Any knocked imprint or repaired sign is not allowed being found on the surface of the outer case of the water meter. Leak-proof paint, wax, water glass (Sodium silicate or liquid glass) or other materials shall not be applied to the inside or outside of the outer case.

3.6 Indicating devices:

3.6.1 Requirements for the indicating device of volumetric and velocity meters:

3.6.1.1 General requirements

3.6.1.1.1 Function: The indicating device shall provide an easy reading, reliable and unambiguous visual indication of the volume flow, and include visual means for verification and calibration and additional elements for verification and calibration by other methods, e.g. automatic.

3.6.1.1.2 Unit of measurement, symbol and its location: The volume of water measured shall be expressed in cubic meters. The unit symbol（m^3）shall appear on the dial or immediately adjacent to the numbered display.

3.6.1.1.3 Indicator range: The indicating device shall be able to record, without passing zero. The volume shall be expressed in cubic meters, and the device shall correspond to at least 1999 hours of operation at the permanent flow-rate. The provision is formulated in table 1.

Table 1 indicator range

q_p , m^3/h	Indicating range m^3 (min.)
$q_p \leqq 5$	9999
$5 < q_p \leqq 50$	99999
$50 < q_p \leqq 500$	999999
$500 < q_p \leqq 4000$	9999999

3.6.1.1.4 Color-coding: Different colors shall be used to distinguish the integer and decimal in cubic meters of the quantities of volume. These colors shall be applied to either the pointers, needles, numbers, wheels, disks, dials or aperture frames.

3.6.1.1.5 Direction of indicator movement: Rotational movement of pointers or circular scales shall be clockwise. Linear movement of pointers or scales shall be left to right. Movement of numbered or indicator rollers shall be upwards.

3.6.1.1.6 Electronic digital indicators: The incremental changing of the electronic digital indicator shall be instantaneous. Black digitals shall be used if the indicator is a LCD indicator while large-size digitals shall be used for integer of cubic meter and small-size digitals shall be used for decimal of cubic meter. Also, the LCD device should equip with blinking and low battery warning function.

3.6.1.2 Types of indicating device:

3.6.1.2.1 Type 1—Analog device: The volume of water is totalized by continuous movement of the following (a) and (b).

（a） One or more pointers moving relative to graduated scales.

（b） One or more circular scales or drums each passing a pointer.

The value expressed in cubic meters for each sub-scale shall be of the form of 10^n, where n is a positive integer, negative integer, or zero, thereby establishing a system of decimal multiples and sub-multiples. Each sub-scale shall be

— either graduated in values expressed in cubic meters,

— or accompanied by a multiplying factor (×0.001；×0.01；×0.1；×1；×10；×100；×1000, etc)

3.6.1.2.2 Type 2—Digital device: The volume is totalized the reading appeared in one or more sight glasses in row. When lower digit is changing from 9 to 0, the upper digit should complete the digit changing simultaneously. The lower digit of decimal indicator may, and the sight glass shall be large enough to indentify unambiguously. The visible height of the digits shall be at least 4mm.

3.6.1.2.3 Type 3—Combination of analog and digital devices: The volume is totalized by the combination of types 1 and 2 indicating devices, and the respective requirements of each shall apply. The lowest digit of decimal of the digital indicator may have a continuous movement.

3.6.2 Requirements for the dial measurement of vortex flow meters:

3.6.2.1 The dial measurement is an LCD with black digitals. The requirements for maximum dial measurement volumes and min. scale divide values are as shown in table 2 below. Large-size digitals are used for integer of cubic meter, whereas small-size digitals are applied to decimal of cubic meter (or other methods which may distinctly divide upper or lower part of the dial measurement unit). In addition, a LCD symbol with the blinking and low battery warning shall be equipped.

Table 2

Unit: m^3

Nominal size (mm)	Max. dial measurement volume (above)	Minimum scale value (below)
50 75 100	999999	0.001
150 200 250 300	9999999	0.01

3.7 Requirements for the verification device of volumetric and velocity meters:

3.7.1 Control element and verification scale interval: The indicator element having the lowest-value decimal is called the control element. Its lowest-value decimal scale divide is called the verification scale interval. The visual verification display should be with either continuous or discontinuous movement. Every indicating device shall provide unambiguous visual methods for verification and calibration via the control element. In addition to the visual method for verification, the indicating device may include auxiliary elements (disks, stars, etc.) for rapid control, through external electronic devices' reading; the auxiliary elements convert into digital data.

3.7.2 Visual verification display

3.7.2.1 Value of the verification scale interval: The value of the verification scale interval, expressed in cubic meters, shall be based on the following formula:
1×10^n, 2×10^n, and 5×10^n.
Where n is a positive or negative integer or zero.
For analog and digital indicating devices with continuous movement of the control element, the verification scale interval may be formed from the divide into two, five or ten equal parts of the interval between two consecutive digits of the control element. The verification scale interval can be no digitalized.
For digital indicating devices with discontinuous movement of the control element, the verification scale interval is the interval between two consecutive digits or incremental movements of the control element.

3.7.2.2 Form of the verification scale interval: The length of the verification scale interval of indicating devices with continuous movement of the control element shall not be less than 1mm and not more than 5mm. The scale shall consist either of lines of uniform thickness not exceeding one-quarter of the distance between the axes of two consecutive lines and differing only in length, or of contrasting bands of a constant width equal to the length of the scale divide. The width of the pointer tip shall not exceed one-quarter of the verification scale interval length and in no circumstance shall it be greater than 0.5mm.

3.7.2.3 Maximum value of the measurement uncertainty caused by reading: The sub-divide of the verification scale shall be small enough for the measurement uncertainty caused by reading the meter to not exceed 0.5% during the test, and such that at the minimum flow-rate of the test shall not take more than 90 minutes. When the display of the control element is continuous, an account shall be taken of a possible reading error of not more than half the length of the smallest scale division. When the display of the control element is discontinuous, an account shall be taken of a possible reading error of not more than one digit. The concepts in 3.7.3 are enumerated in table 3.

3.8 The verification scale lines of the verification device of volumetric meters and velocity meters shall be evenly symmetrical and the width shall not exceed 0.2mm.

3.9 The error of carrying digit of the verification device of volumetric and velocity meters, when the upper needle and digit moves one scale divide, causing the lower needle or digit plate to turn 360 degrees, shall not be beyond +/- 12 degrees.

3.10 The gear chamber of dry water meters shall be watertight.

3.11 Closed water meters with magnetic transmission and electronic water meters shall be equipped with more than 1500 gauss of antimagnetic function.

3.12 Volumetric and velocity types of multi-jet meters shall be installed with a filter.

3.13 The provision of maximum values (minimum scale valued) is listed in table 3 and 4.

Table 3 Volumetric type and velocity type

Unit：m^3

Meter designation N	Analog and digital devices with continuous movement of the control element (division 1)				Analog and digital devices with discontinuous movement of control element (division II)			
	Class A	Class B	Class C	Class D	Glass A	Class B	Class C	Class D
1.5	0.0002	0.0002	0.0001	0.00005	0.0002	0.0001	0.00005	0.00002
2.5	0.0005	0.0002	0.0001	0.0001	0.0002	0.0001	0.00005	0.00005
3.5	0.001	0.0005	0.0002	0.0001	0.0005	0.0002	0.0001	0.00005
10	0.002	0.001	0.0005	0.0005	0.001	0.0005	0.0002	0.0001
15	0.005	0.002	0.0005		0.002	0.001	0.0002	
25	0.01	0.005	0.001		0.005	0.002	0.0005	
30	0.01	0.005	0.001		0.005	0.002	0.0005	
35	0.02	0.005	0.001		0.001	0.002	0.0005	
40	0.02	0.005	0.001		0.01	0.002	0.0005	
45	0.02	0.01	0.002		0.01	0.005	0.001	
50	0.02	0.01	0.002		0.01	0.005	0.001	
60	0.02	0.01	0.002		0.01	0.005	0.001	
100	0.05	0.02	0.002		0.02	0.01	0.002	
150	0.05	0.02	0.005		0.02	0.01	0.002	
250	0.1	0.05	0.01		0.05	0.02	0.005	
400	0.2	0.05	0.01		0.1	0.02	0.005	
600	0.2	0.1	0.02		0.1	0.05	0.01	

Table 4 Vortex flow meters

Nominal size (mm)	Minimum scale value（m^3）
Between 50 and 100 0	Less than 0.001
Greater than 100 until 300	Less than 0.01

3.14 For the water meter with a separated indication chamber, the separated indication chamber shall not be opened after verified and sealed.

3.15 The top lid of water meters shall be able to be lifted up to more than 120°.

3.16 Water meters shall not have the reset device, but it is not limited to those indicated for special applications. If a device has the return-to-zero function, each display (indication) value shall all be reset to zero during operation, and the error shall not exceed 1/5 of one scale division.

3.17 After verified and sealed, water meters shall not be further adjusted and they shall not have any structure for external adjustment.

4. Verification, Inspection and Maximum Possible Errors

4.1 Verification and inspection equipment: A certificate is required to identify the traceability and uncertainty of the system of the verification equipment.

4.1.1 Necessary equipment: It includes a device with accuracy of the measurement error of the minimum scale value below 1/500 of the measured water volume for verification and inspection. The volume range shall be set according to the meter designation value N and the class of the verification and inspection meter. The necessary equipment can be for the volumetric method or weighing method use.

4.1.2 Pressure test device: The device shall be able to pressurize up to more than 2 MPa for pressure test use.

4.1.3 Timer device: The device shall equip with minimum scale value less than 0.2 seconds.

4.2 Every water meter shall be able to endure pressure test up to 1.6MPa of pressure or 1.6 times of nominal pressure three times in one minute without leakage or damage.

4.3 The procedure of verification and inspection of flow rate of water meters:

4.3.1 Testing method with readings taken with the flow passing the meter still
(1) Water meters can be verified simultaneously in series. When verifying in series, the two adjacent meters shall be spaced by a straight pipe with proper length.
(2) After the water meter is installed, water shall be put in to vent the air out from the water meter and piping system, then setting verifying flow rate by adjusting the outlet cock (valve). The water pressure at the inlet end of the water meter shall be kept at least 5 kPa.
(3) Prior to putting in water for verification, the meter's indicating value and its standard equipment's indicating value shall be recorded.
(4) After the water volume for verification has passed, the outlet cock (valve) of the system shall be closed so as to avoid backflow, then closing the inlet cock immediately, record the meter's indicating value and the necessary equipment's value after the water flow completely stops.

4.3.2 Tests with readings taken under stable flow conditions and diversion of flow
(1) Water meters can be verified simultaneously in series. When verifying in series, the two adjacent meters shall be spaced by a straight pipe with proper length.
(2) After completing the installation of the water meter, water shall be put in to vent the air out from the water meter and piping system, then setting verifying flow rate by adjusting the outlet cock (valve). Thee water pressure at the inlet end of the water meter shall be kept at least 5 kPa.
(3) Prior to putting in water for verification, the meter's indicating value and the necessary equipment's indicating value shall be recorded.
(4) The test procedure is carried out after the flow reaches steady. The flow is diverted into a calibrated vessel at the beginning of the procedure and diverted it away at the end. The meter is read while the flow passing. The reading of the meter is synchronized with the movement of the flow diverting. The volume collected in the vessel is the volume passed. The uncertainty of the collected volume may be considered negligible if the times deviation of each flow diverting is less than 5% and the diverting time is less than 1/50 of the total time of the procedure.

4.4 Flow-rate and minimum passed water volume for verification and inspection

4.4.1 Tests method with readings taken with the flow passing the meter still

The flow-rate and the minimum passed water volume for verification and inspection for different type meters are shown in tables 5, required as per the formula written below (in which the meter with the nominal size between two meter designation, shall use the value N, which is closest to the meter designation or the greater nominal size). The relative variation of the flow-rate for verification shall be within the range of 5%.

Table 5 Volumetric and velocity types (meter designation N ≤ 15)

N	Class	Flow-rate		Min. passed water volume for verification and inspection	
		q_t ~ 1.1 q_t (m^3 / h)	0.9 q_p ~ q_p (m^3 / h)	q_t ~ 1.1 q_t (L)	0.9 q_p ~ q_p (L)
1.5	A	0.150 ~ 0.165	1.35 ~ 1.5	50	300
	B	0.120 ~ 0.132		50	300
	C	0.0225 ~0.0248		20	300
	D	0.01725 ~ 0.01898		10	300
2.5	A	0.250 ~ 0.275	2.25 ~ 2.5	100	300
	B	0.200 ~ 0.220		50	300
	C	0.0375 ~ 0.0413		20	300
	D	0.02875 ~ 0.03163		20	300
3.5	A	0.350 ~ 0.385	3.15 ~ 3.5	100	300
	B	0.280 ~ 0.308		50	300
	C	0.0525 ~ 0.0578		20	300
	D	0.04025 ~ 0.04428		10	300
10	A	1.000 ~ 1.100	9 ~ 10	200	1000
	B	0.800 ~ 0.880		100	1000
	C	0.150 ~ 0.165		50	1000
	D	0.1150 ~ 0.1265		50	1000
15	A	4.500 ~ 4.950	13.5 ~ 15	500	2000
	B	3.000 ~ 3.300		200	2000
	C	0.2250 ~ 0.2475		100	2000

Note: The minimum passed water volume for verification and inspection shall not less than the minimum meter scale multiplied by 200

The q_{min} and q_t of Volumetric and velocity are shown in table 6.

Table 6 – Classification of water meters according to values of q_{min} and q_t in cubic meters per hour

Class	Numerical value of meter designation N	
	N<15	N≧15
Class A		
q_{min}	0.04N	0.08N
q_t	0.10N	0.30N
Class B		
q_{min}	0.02N	0.03N
q_t	0.08N	0.20N
Class C		
q_{min}	0.01N	0.006N
q_t	0.015N	0.015N
Class D		
q_{min}	0.0075N	-
q_t	0.0115N	-

The water volume for verification and inspection of the meter designation value N may increase or decrease according to varying test equipment or meter's min. scale values. However, the total test time of respective flow rates shall be no more than 90 minutes.
By substituting the minimum water volume for verification and inspection of the meter designation value N into the following formulae, the minimum water volume for verification and inspection at the flow rates of $q_t \sim 1.1\ q_t$ and $0.9\ q_p \sim q_p$ can be respectively yielded:
The minimum water volume for verification and inspection of $q_t \sim 1.1\ q_t$ = The minimum meter scale value multiplied by 200, which shall not be less than the volume accumulated from 5 minutes of flow.
The minimum water volume for verification and inspection of $0.9\ q_p \sim q_p$ = The minimum meter scale value multiplied by 200, which shall not be less than the volume accumulated from 5 minutes of flow.
To vortex meters, the minimum water volume for verification and inspection of the meter designation value N into the following formulae, the min. water volume for verification and inspection at the flow rates of $0.95\ q_b \sim 1.05\ q_b$ and $0.95\ q_a \sim 1.05\ q_a$ can be respectively yielded:
The minimum water volume for verification and inspection of $0.95\ q_b \sim 1.05\ q_b$ = The minimum meter scale value multiplied by 200, which shall not be less than the volume accumulated from 5 minutes of flow.
The minimum water volume for verification and inspection of $0.95\ q_a \sim 1.05\ q_a$ = The minimum meter scale value multiplied by 200, which shall not be less than the volume accumulated from 5 minutes of flow.

4.4.2 Tests with readings taken under stable flow conditions and diversion of flow
The flow-rate and the minimum water volume for verification and inspection of a variety of meters are shown as the formula (in which the meter with the medium nominal size shall use the value N, which is closest to the meter designation or a numerical value with a greater nominal size). The relative variation of the flow–rate for verification shall be within the range of 5%.

By substituting, to volumetric and velocity meters, the minimum water volume for verification and inspection of the meter designation value N into the following formulae, the min. water volume for verification and inspection at the flow rates of $q_t \sim 1.1\ q_t$ and $0.9\ q_p \sim q_p$ can be respectively yielded. However, the total test time of respective flow rates shall be no more than 90 minutes:
The minimum water volume for verification and inspection of $q_t \sim 1.1\ q_t$ = The minimum meter scale value multiplied by 200, which shall not be less than the volume accumulated from 3 minutes of flow.
The minimum water volume for verification and inspection of $0.9\ q_p \sim q_p$ = The minimum meter scale value multiplied by 200, which shall not be less than the volume accumulated from 1 minute of flow.

To vortex meters, the minimum water volume for verification and inspection of the meter designation value N into the following formulae, the min. water volume for verification and inspection at the flow rates of $0.95\ q_b \sim 1.05\ q_b$ and $0.95\ q_a \sim 1.05\ q_a$ can be respectively yielded:
The minimum water volume for verification and inspection of $0.95\ q_b \sim 1.05\ q_b$ = The minimum meter scale value multiplied by 200, which shall not be less than the volume accumulated from 3 minutes of flow.
The minimum water volume for verification and inspection of $0.95\ q_a \sim 1.05\ q_a$ = The minimum meter scale value multiplied by 200, which shall not be less than the volume accumulated from 1 minute of flow.

4.5 Error of water meter, the percentage of the volume of water indicated by the verified meter subtracts the volume of real passed water relative to the volume of real passed water.

4.6 The maximum possible errors for verification of water meters are ± 2 % of the measured volume.

4.7 The maximum possible errors for inspection of water meters are twice the maximum possible errors for verification.

4.8 Valid period of verification
The valid period of verification for water meters is eight years, starting from the date of the very beginning of next month of obtaining the verification certification.

4.9 Maximum useable span

The maximum useable span for meters with the designation of N<15 or nominal size not greater than 40 mm is 8 years after passing initial verification; however, for The maximum useable span for meters with the designation of N≧15 or nominal size greater than 40 mm is 10 years after passing initial verification. To apply for subsequent verification for meter that over its maximum useable span is not allowed.

5. Verification marks

5.1 The verification marks shall be pressed with lead sealing between the metal wire and the opening of the outer case lead sealed through the lock. Also, the words “valid period of verification year month” shall be printed on the edge of the upper outer case.

5.2 For a large meter with the designation of N≧15 or a nominal size greater than 40 mm passing the subsequent verification, the maximum useable span shall be additionally marked on the edge of the meter’s upper outer case.