ASME A112.4.7-2002

POINT OF USE AND BRANCH WATER SUBMETERING SYSTEMS

AN AMERICAN NATIONAL STANDARD

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ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the ASME Web site under the Committee Pages at http://www.asme.org/codes/ as they are issued.

The American Society of Mechanical Engineers
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In memory of, and dedicated to the life of,
our dear friend, colleague, and long-standing leader,
Patrick J. Higgins.

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FOREWORD

The measurement of fluids within a plumbing system is performed to provide an accurate assessment of fluid use or to determine leakage in plumbing systems. This Standard was originally developed as an Interim Guide Criteria document by the International Association of Plumbing and Mechanical Officials (IAPMO). The development of this Standard was authorized by the ASME A112 Main Committee during its meeting in July 2000 based on a request from IAPMO. The preparation of this Standard was assigned to A112 Project Team 4.7.

This Standard was approved as an American National Standard on April 12, 2002.

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Standardization of Plumbing Materials and Equipment

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POINT OF USE AND BRANCH WATER SUBMETERING SYSTEMS

1 GENERAL

1.1 Scope

This Standard establishes the physical and accuracy requirements, and test methods that pertain to point of use and branch submetering systems applied in the plumbing system serving a single residence downstream of the main utility meter.

The provisions of this Standard are not intended to prevent the use of any alternate material or method of construction, provided any such alternate meets or exceeds the intent of this Standard.

1.2 Units of Measurement

Values are stated in U.S. Customary units and in the International System of Units (SI). The U.S. Customary units shall be considered as the standard.

In this Standard, gallons (U.S. liquid) per minute is abbreviated gpm and liters (metric liquid) per minute is abbreviated L/min.

1.3 References

The following documents form a part of this Standard to the extent specified herein.

ANSI/AWWA C700-95, Cold-Water Meters — Displacement Type, Bronze Main Case[1]

Publisher: American Water Works Association (AWWA), 6666 West Quincy Avenue, Denver, CO 80235

NSF/ANSI 61-2001, Drinking Water System Components — Health Effects[1]

Publisher: National Sanitation Foundation (NSF International), 789 North Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48113-0140

1.4 Definitions

encoder register: a means of storing accumulated meter data in an unalterable electronic record.

fixture branch: a water supply pipe between the fixture supply and water distribution pipe.

fixture supply: a water supply pipe connecting the fixture with the fixture branch.

main branch: a water supply pipe that serves an entire housing unit.

point of use: the point at which water leaves the fixture branch pipe and enters a fixture supply.

register: a permanent unalterable record of accumulated meter data.

submeter: a device located in a plumbing system downstream of a main utility water meter which measures accumulated hot and cold water flow for the purpose of determining consumption in various branch piping systems, plumbing fixtures, and plumbing appliances.

2 REQUIREMENTS

2.1 Installation

Submeters shall be designed with standard American IPS-NPT, NPSM, BSP, or compression fittings of $^{3}/_{8}$-in., $^{5}/_{16}$-in., $^{1}/_{2}$-in., $^{5}/_{8}$-in., $^{3}/_{4}$-in., or $^{7}/_{8}$-in. hose connection.

2.2 Durability

Submeter devices shall be designed for a minimum operating life of 500,000 gal (1 892 773 L) at accuracy levels specified in para. 2.9, operating at the maximum continuous flow rate, also specified in para. 2.9.

2.3 Batteries

If battery operated components are used in conjunction with submeters, projected battery life shall exceed 5 years, and batteries or battery packs shall be removable from the piped meter assembly without need to disconnect the meter body from the piping system. An external indication of battery life shall be required at least 3 months prior to battery failure. The manufacturer shall submit computations showing battery life based on operation at 65% of operating capacity over 30 min

[1] May also be obtained from American National Standards Institute, 25 West 43rd Street, New York, NY 10036.

per day for point-of-use applications, and 60 min for branch applications. In addition, the manufacturer shall submit, in writing, a description of battery failure indication.

2.4 Flow Rates and Pressure Loss

Submeters shall be capable of safely operating at flow rates listed below, with pressure losses not to exceed the specified values when tested in accordance with para. 3.2.

Point of Use	Required Flow	Maximum Pressure Loss
Faucets	2.2 gpm (8.4 L/min)	4.5 psi (31.0 kPa)
Showers	2.5 gpm (9.5 L/min)	5.0 psi (34.5 kPa)
Water closet [Note (1)]	3.0 gpm (11.3 L/min)	6.5 psi (44.8 kPa)
Tub fillers [Note (2)]	5.0 gpm (18.9 L/min)	7.5 psi (51.7 kPa)
Hose bibbs	5.0 gpm (18.9 L/min)	7.5 psi (51.7 kPa)
Hot water branch	8.0 gpm (30.3 L/min)	15.0 psi (103.4 kPa)
Cold water only branch	8.0 gpm (30.3 L/min)	15.0 psi (103.4 kPa)
Multiple points (i.e., main branch)	15.0 gpm (56.8 L/min)	15.0 psi (103.4 kPa)

NOTES:

(1) Flow rate is typical for a tank-type water closet. Tankless water closets using flushometer valves are not covered in this Standard.

(2) Flow rate is typical for a normal tub filler. Tub fillers with design flow rates in excess of 15.0 gpm (56.8 L/min) require a meter with operating capacity at or above the design flow rate of the tub filler, with a pressure loss at the design flow rate of no greater than 15.0 psi (103.4 kPa).

2.5 Minimum Sensed Flow

Submeters shall be capable of sensing that flow is occurring at a minimum of 0.1 gpm (0.38 L/min).

2.6 Temperature Range

Normal temperature operating range for meters used only in cold domestic water systems shall be 45°F to 80°F (7.2°C to 26.7°C). All point of use meters and hot water branch meters shall be capable of operating and maintaining accuracy in either cold or hot water, at temperatures between 45°F and 150°F (7.2°C and 65.6°C).

2.7 Pressure Requirement

Meters shall operate without leakage or damage to any part when operated at normal building pressures between 20 psi and 80 psi (137.9 kPa and 551.6 kPa), but shall be able to sustain 150 psi (1034.2 kPa) of continuous pressure and pressure spikes up to 300 psi (2068.4 kPa) when tested in accordance with para. 3.2.1.

2.8 Data Register

Submeters shall maintain a permanent record of recorded accumulated flow at the meter. The register shall be either visible or encoded in nonvolatile memory, accessible from a service tool provided by the manufacturer that works in conjunction with the submetering system. The register shall be attached to the submeter in such a way that a special tool is required for its removal. Tamper detection indicating the removal of the register, or provision for the addition of a tamper indication device, shall be provided.

2.9 Metering System Accuracy and Capacity

Submeters shall be capable of accuracy and capacity levels as follows:

(a) operating capacity: required flow from para. 2.4 or greater;

(b) maximum pressure loss at operating capacity: in accordance with para. 2.4;

(c) maximum continuous flow: 65% of operating cap;

(d) normal test flow limits: 0.5 gpm (1.89 L/min) to operating cap;

(e) accuracy at normal flows: 98.5% to 101.5%;

(f) minimum measurable flow: 0.25 gpm (0.95 L/min);

(g) accuracy at minimum measurable flow: 95% to 101%;

(h) minimum sensed flow: 0.1 gpm (0.38 L/min);

(i) accuracy at minimum sensed flow: no requirement.

NOTE: The above requirements are consistent with the national utility standard ANSI/AWWA C700-95, which governs utility use of positive displacement water meters.

2.10 Toxicity

Materials that come in contact with potable water shall comply with the applicable requirements of section 8 of NSF/ANSI 61.

3 TESTING

The following tests shall be performed in the following sequence on one device.

3.1 Durability and Installation

3.1.1 Test Method. The submeter shall be installed in a test fixture as recommended in the manufacturer's instructions.

(a) Cold water meters shall be tested with water at temperatures of less than 80°F (26.7°C), flowing through the meter operating at 80% of the operating capacity for a period of 5 min, followed by a period of 15 sec with no flow. This cycle shall be repeated 2500 times.

(b) Submeters designed for use on domestic hot water systems shall be tested as specified in (a) above, using water at 150°F (65.6°C).

3.1.2 Performance Requirement. Parts shall not bind or seize during operation. Any signs of cracking, leakage, breakage, or bearing failure shall be grounds for rejection.

3.2 Pressure Testing

3.2.1 Test Method. The meter shall be operated continuously at 150 psi (1034.2 kPa) for a period of 200 hr at 65% of the operating capacity of the meter and then subjected to 50 repeated 300 psi (2068.4 kPa) spikes of pressure. A *pressure spike* shall be defined as an increase of pressure from 150 psi to 300 psi (1034.2 kPa to 2068.4 kPa) over a period of less than 1 sec, followed by a decrease in pressure from 300 psi to 150 psi (2068.4 kPa to 1034.2 kPa) over a similar period.

3.2.2 Performance Requirement. Any evidence of failure, cracking, or leaking after test is complete shall be cause for rejection of the device.

3.3 Flow Rates, Accuracy, and Pressure Loss

3.3.1 Test Method. A calibrated volume source at temperatures below 80°F (26.7°C) shall be connected to the submeter system in its entirety, including register (and/or encoder register) and any external system required for reading the meter register. The tests for pressure loss, and accuracy of the flow reading reported by the system, shall be run at six operating conditions:

(a) the operating capacity of the meter;
(b) at 65% of the operating capacity of the meter;
(c) at 25% of operating capacity;
(d) at the normal test flow lower limit;
(e) at the minimum measurable flow; and
(f) at the minimum sensed flow of 0.1 gpm (0.38 L/min) (no accuracy or pressure loss requirement).

3.3.2 Hot Water Meter Test Method. The test defined in para. 3.3.1 shall be repeated at 120°F (48.9°C) for any meter that is intended for use in a hot water branch or supply lines. Accuracy computations shall be equal to the registered measurement divided by the actual volume of equivalent cold water at 60°F (15.6°C) consumed during the test.

3.3.3 Performance Requirement. Minimum sensed flow, maximum pressure loss, and flow accuracy levels specified in paras. 2.4 and 2.9 shall be met. Failure to perform at these levels or any leakage from the meter itself during the test shall result in rejection of the device.

4 MARKING AND IDENTIFICATION

The submeter shall be permanently and legibly marked with the following:

(a) manufacturer's name or trademark
(b) model number
(c) safe maximum operating capacity

ASME STANDARDS RELATED TO PLUMBING

Air Gaps in Plumbing Systems ..... A112.1.2-1991(R1998)
Air Gap Fittings for Use With Plumbing Fixtures, Appliances, and Appurtenances A112.1.3-2000
Performance Standard and Installation Procedures for Stainless Steel Drainage Systems for Sanitary, Storm, and Chemical Applications, Above and Below Ground A112.3.1-1993
Macerating Toilet Systems and Related Components A112.3.4-2000
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