ASME A112.19.6-1995
(Revision of ASME A112.19.6-1990)

HYDRAULIC PERFORMANCE REQUIREMENTS FOR WATER CLOSETS AND URINALS

AN AMERICAN NATIONAL STANDARD

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Date of Issuance: April 19, 1996

This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda or written interpretations of the requirements of this Standard issued to this Edition.

FOREWORD

(This Foreword is not part of ASME A112.19.6-1995.)

This Standard was developed from the ASME/ANSI A112.19.2-1982 Vitreous China Plumbing Fixtures standards in an effort to identify key operational performance tests for water closets and urinals.

It includes a revised series of tests for waste removal and water consumption of water closets and urinals. Laboratory tests in the body of the text are mandatory for compliance with this Standard.

Except as specified, additional laboratory tests in the Appendix are optional tests which may be used to evaluate bowl performance characteristics not covered in the required tests.

The Drainline Transport Characterization Procedure was added to the Standard in response to concerns about the impact of low consumption water closets on plumbing drainlines. Since existing research does not correlate laboratory results with actual field results, the 40 ft average carry may need to be adjusted as experience with low consumption water closets is developed.

Efforts are ongoing to develop additional tests for fouling deposition and for bowl classification by use. Future editions will reflect these changes. Due to extensive technological growth in low consumption product designs, it is the intent to revise this Standard on frequency rather than the required five year cycle.

Section 9 of this document was added to reflect the basic parameters for testing products other than hydraulic-only designs. Although originally suggested as an Appendix to the Standard, it was moved to the body of the Standard to be consistent with ASME policies for standards development.

This Standard has been approved by the ASME Committee A112, Standardization of Plumbing Materials and Equipment, Panel 19 on Plumbing Fixtures and by the American Society of Mechanical Engineers. On April 6, 1995, the American National Standards Institute adopted this proposal as an American National Standard, and designated it as ASME A112.19.6-1995.

The Working Group is continuing in its efforts to improve this Standard. Amendments in the forthcoming edition will include new tests and product classifications for water closet bowls.

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HYDRAULIC PERFORMANCE REQUIREMENTS FOR WATER CLOSETS AND URINALS

1 PURPOSE

The purpose of this Standard is to define hydraulic performance tests for the safe and sanitary operation of water closets and urinals.

2 SCOPE

This Standard establishes sanitary performance requirements and test procedures for water closets and urinals discharging into gravity waste systems in permanent buildings and structures.

3 TEST MEDIA

The test media used in Section 7 reflect commonly available materials. (See Appendix B for additional details on the test media.) Equivalent media shall be permitted to be used to conduct the tests. See Section 9 for alternative testing criteria.

When equivalent media are substituted, the test report shall state that the substitution was made, and shall also state the criteria for the substitution to show equivalency, with verification for or supporting tests to show that proper evaluation was substantially satisfactory.

4 STANDARDS

The following standards which are referenced in this document, shall be applicable to this Standard. The latest edition of each standard shall be applied.

ASME Standards (Approved as American National Standards)

A112.19.2M Vitreous China Plumbing Fixtures
A112.19.5 Trim for Water Closet Bowls, Tanks, and Urinals
PTC 19.2 Power Test Code Supplement, Instruments and Apparatus, Part 2, Pressure Measurement
Interim Supplement 19.5 Instruments and Apparatus, Application, Part II of Fluid Meters, Sixth Edition, 1971

ASSE Standards

1037 Pressurized Flushing Devices for Plumbing Fixtures (Flushometers)
1002 Water Closet Flush Tank Ball Cocks

ASTM Standard

D3311 Drain, Waste and Vent (DWV) Plastic Fitting Patterns

5 DEFINITIONS

cycle time — the time beginning at the instant the flush release device is operated and ending at the instant the water supply valve is completely shut off and the water stops flowing

flow pressure — the pressure in the water supply pipe at the fixture fitting, valve, or water inlet while the fitting valve or water outlet is flowing

pressurized flushing devices — a product which uses the water supply to create a pressurized discharge to flush fixtures and which is exclusive of gravity-type flushing systems. Flushometer valves and flushometer tanks are examples of pressurized flushing devices. This term is also called a pressurized flushing device, a flushometer, or a pfd in this Standard. See ASSE 1037.

sanitary — reasonably acceptable appearance and not necessarily microbiologically clean

spud — a threaded waterway assembly inserted into the fixture for assembly of valves or trim

static pressure — the pressure at the valve inlet that is exerted under a "no flow" condition

tank fill time — the time beginning at the instant the tank flush valve closes and ending at the instant the water supply valve is completely shut off

trap — a fitting, device, or integral fixture portion so designed and constructed as to provide a liquid seal which will prevent the back-passage of sewer gas without materially affecting the flow of sewage or wastewater through it

trap dip (water closet) — the highest point of the opening from the well into the trapway

trim — parts other than china or plastic regularly supplied with a fixture, as for example, closet spuds, wall hangers, and tank flush valves. Trim does not include fittings. Reference ASME/ANSI A112.19.5M.

urinal — a plumbing fixture which receives only liquid body waste and, on demand, conveys the waste through a trap seal into a gravity drainage system

visible surface — the surface that is readily visible to an observer in a normal standing position after installation of the fixture

water closet — a plumbing fixture having a water containing receptor which receives liquid and solid body waste and, upon actuation, conveys the waste through an exposed integral trap seal into a gravity drainage system

water surface — the surface of the still water in the water closet bowl when filled to the trap weir

weir — the barrier in a trapway that controls the water level

well — a pocket open at the top, formed inside a water closet bowl or urinal at the entrance to the trapway

6 GENERAL REQUIREMENTS

6.1 Trap Seal

The depth of seal for integral traps in all fixtures shall be not less than 2 in. (50 mm).

6.2 Illustrations

Illustrations in this document are shown for convenience. For guidance purposes, dimensional data and related specifications shall be found in ASME A112.19.2M, Vitreous China Plumbing Fixtures.

7 METHODS OF TESTS FOR WATER CLOSETS

7.1 Laboratory Tests for Waste Removal and Water Consumption

7.1.1 General. This Section presents test methods and performance requirements for water closets with respect to waste removal and water consumption. These test methods and performance requirements shall apply to all water closets. Where materials other than vitreous china are used in a trapway, Section 7.7, Closet Auger Test, of ASME A112.19.2M, shall be conducted before conducting any hydraulic performance test.

7.1.2 Test Apparatus and General Instructions. During all tests, pressure measuring methods and instruments shall conform to the intent of ASME PTC 19.2. All flow measuring methods and instruments shall conform to the intent of ASME Interim Supplement 19.5, Part II of Fluid Meters.

The principal features of the test apparatus are shown in Figs. A-1, A-2A, and A-7 in Appendix A. Listed below are preparations and general instructions for testing.

7.1.2.1 Before connecting and testing fixtures, the water supply system shall be standardized in accordance with the procedures specified by Figs. A-2A and A-2B with associated notes and procedures and A.1 of Appendix A.

7.1.2.2 The bowl shall be placed on a flat, level surface, the trap and outlet clear, and the bowl filled to trap weir level before making each test run.

7.1.2.3 Unit Adjustment. Test pressure for the individual laboratory tests for tank-type and flushometer-type closets shall be set in accordance with Table 1.

(a) Gravity-Type Flush Tank Water Closets. At each supply pressure specified for the individual tests for gravity-type flush tank water closets, the water level in the tank and the fill time shall be adjusted according to the manufacturer's instructions and specifications for the tank. In the absence of such instructions and specifications, the tank shall be filled to the water line where marker or, in the absence of a mark, to a point 1 in. (25 mm) below top of highest point of the overflow, and the supply fill valve (ballcock) shall be set in the full flow position. Water closets which require special supply pressures shall be adjusted in accordance with manufacturer's instructions. This requirement shall apply for all tests.

(b) Testing One-Piece Water Closets. Testing shall be done in accordance with manufacturer's instructions. In the absence of manufacturer's instructions, the unit shall be tested at 20 psig static pressure.

(c) Flushometer Valve Water Closets. At each test pressure specified for individual tests for flushometer (pressurized flushing device) type water closets, the stop shall be adjusted to the manufacturer's instructions and specifications.

7.1.2.4 If the particular test calls for a test load, the test load shall be placed in water closet bowl.

7.1.2.5 The flush device shall be tripped and released in a normal manner.

7.1.2.6 The water closet shall be allowed to discharge into receiving vessel. Test materials remaining in the bowl, if any, and those discharge through the closet outlet shall be observed. Then, if required for removal of all test material, the water closet shall be flushed again one or more times without additional test media to remove all material from the bowl or trapway before each replicate test run. One or more runs shall be made for each test condition, as stated in the detailed procedures for the individual test.

7.1.2.7 The results shall be evaluated and the data shall be reported in accordance with the detailed procedures specified for each test, paras. 7.1.3 through 7.1.6. Suggested formats for reporting the test are shown in Appendix A.

7.1.3 Removal of Solids

7.1.3.1 Ball Test

(a) Test Method

(1) Test Media.[1] The test media shall be 100 polypropylene balls having a diameter of 0.75 ± .015 in. (19 mm) and the density per ball between 850–900 kg/m^3.

(2) Procedure. The 100 balls shall be dropped in the bowl and the flush release device shall be tripped. After completion of this initial flush, balls remaining visible in the bowl and those passing completely out of the trapway (out of the fixture) shall be counted. Trap seal restoration (see para. 7.1.6.3 for procedure) shall be observed. This shall complete one test run. The procedure shall be repeated until three sets of data are obtained.

(3) Report. The number of balls remaining visible in the bowl after initial flush, the number flushed out, and the number remaining in the trapway shall be reported using Table A-1.

(b) Performance Requirement. For acceptance, 75 balls per initial flush shall be flushed out of the bowl, based on the average of three initial flushes.

7.1.3.2 Granule Test Method

(a) Test Method

(1) Test Media.[1] The test media shall be 6 cu. in. (100,000 mm^3) (approximately 2500 count) disc-shaped high density polyethylene (HDPE) granules of 0.170 ± 0.010 in. (4.32 ± 0.25 mm) diameter thickness and an average bulk density of 0.940–0.950 kg/m^3.

(2) Procedure. The 6 cu. in. (100,000 mm^3) of PE granules shall be added to water in the bowl. The flush device shall be tripped and released. After completion of this initial flush, the granules remaining visible in bowl shall be counted. The trap seal restoration (see para. 7.1.6.3 for procedure) shall be observed. Three sets of data shall be obtained.

(3) Report. The number of granules remaining visible in the bowl after flushing shall be reported using Table A-2.

(b) Performance Requirement. Not more than 125 granules (5%) shall be visible in the bowl after each initial flush.

7.1.4 Washing of Flushing Surface (Rim Wash)

7.1.4.1 Ink Test

(a) Test Method

(1) Test Media.[1] The test media shall be applied by an artist's felt-tipped pen containing a contrasting colored, water-soluble ink.

(2) Procedures. The flushing surface shall be scrubbed clean with commercial scouring powder to remove any build-up or deposits on the walls. The surface shall be rinsed and dried with oil-free air. A line shall be inked around the circumference of the flushing surface at a level one (1) in. below the rim jets of the bowl, limiting the line to a maximum distance of 3.75 in. below the highest point of the rim at that location. This line shall be permitted to be less than one (1) in. below the jets in order to achieve the 3.75 in. maximum dimension. The flush device shall be tripped and released and the line shall be observed during and after the flush. When the flushing cycle is completed [tank completely refilled or flushometer (pfd) cycle completed and trap refill water delivery completed], the lengths of the unwashed line segments where the ink has remained on the flushing surface shall be measured, and their approximate position in the bowl shall be noted. This shall complete one test. The procedure shall be repeated until three sets of data are obtained. If any portion of the ink line is removed by splashing water, the test run shall be disregarded and the unit shall be retested.

(3) Report. The number and lengths of ink line segments remaining and their positions in the bowl shall be reported using Table A-4.

(b) Performance Requirements. The total length of ink line segments remaining on the flushing surface after each flush shall not exceed 2 in. (50 mm) as averaged over three test runs. No individual segments shall be longer than ½ in. (13 mm).

7.1.5.1 Dye Tests

(a) Test Method

(1) Five (5) grams of methylene blue powder shall be added to one (1) L of water and mixed thoroughly in a clean container.

[1] See Appendix B for description and sources of test media.

(2) The clean bowl under test shall be flushed once and allowed to complete its filling cycle. Thirty (30) ml of the dye solution shall be added to the water in the bowl and mixed thoroughly.

(3) Ten (10) ml of this solution shall be removed from the bowl and shall be added to 1,000 ml of clean water in a suitable container (i.e.: dilution ratio of 100:1). A sample of this solution shall be set aside in a test tube or comparator vial as the control sample.

(4) The bowl shall then be flushed several times to ensure that all traces of the dye solution are removed. Thirty (30) ml of the dye solution [see (1) above] shall be added to the bowl. The flush device shall be tripped and released in a normal manner and the test fixture shall be allowed to complete its filling cycle. A test tube or comparator vial shall be filled with water from the bowl and compared against the control sample. The test shall be repeated two additional times and the results shall be averaged. Table A-9 is an acceptable recording chart for these data.

NOTE: Use of a spectrophotometer shall be permitted to be used in cases of doubt; however, this method shall necessitate the use of a different color dye.

(b) Performance Requirement. A dilution ratio of at least 100 shall be obtained in each initial flush, for the average of the three tests. The procedures shall be repeated until three sets of data are obtained.

7.1.6 Water Consumption and Hydraulic Characteristics

7.1.6.1 Water Consumption Test. The measurement of consumption shall only be necessary for water-saving and low-consumption water closets.

(a) Test Method

(1) Apparatus. A test apparatus shall be assembled. A suggested method is shown in Fig. A-1. The receiving vessel shall be permitted to be tested with either a vessel which is calibrated in volume increments not exceeding 0.1 gal. (0.4 L) or with the use of a load cell with readout in increments not exceeding 0.1 gal. (0.4 L).

(2) Procedure. The static pressure shall be observed, then the flush release device shall be tripped. The flow pressure (minimum value) shall be observed. Peak flow rates as indicated by the flow meter shall also be observed.

When the main flush is completed, as indicated by cessation of the trailing flow which occurs at the end of the principle discharge, the volume received in the vessel (main flush volume) shall be observed. Again the volume (total flush volume) shall be observed after cessation of flow of the excess trap refill water (after flow) occurs, subsequent to the first observation. The amount of excess trap refill (after flow) shall be determined by subtracting the main flush volume from the total flush volume. Trap seal restoration shall be measured (see para. 7.1.6.3 for procedure). This shall complete one test run.

The procedure shall be repeated until three sets of data are obtained for each test pressure specified in Table 1.

(3) Report. Static pressure, peak supply flow rate, minimum flow pressure, main and total flush volume, and after flow shall be reported in a format similar to Table A-5 and Fig. A-5.

(b) Performance Requirements

(1) The average water consumption (total flush volume) of low-consumption water closets over the range of test procedures specified in Table 1 for para. 7.1.6.1 shall not exceed 1.6 gal. (6.0 L) and the water consumption shall not exceed 2.0 gal. (7.6 L) at any one test pressure (based upon average values from the three-run test sets).

(2) The average water consumption (total flush volume) of water-saving water closets over the range of test pressures specified in Table 1 for para. 7.1.6.1 shall not exceed 3.5 gal. (13.5 L). The water consumption shall not exceed 4.0 gal. (15.1 L) at any one test pressure (based upon average values from the three-run test sets).

(3) Cycle time shall not exceed 3 min at any static pressure over the range of 20 to 80 psig (0.14 to 0.55 MPa).

7.1.6.2 Trap Seal Depth Determination

(a) Test Method

(1) Apparatus. Fig. A-4 depicts a suggested apparatus for determining trap seal depth.

(2) Procedure.[2] The probe shall be lowered until horizontal element is resting against the bottom of the trap dip. The corresponding scale value, h_1 shall be observed. Then the horizontal element shall be disengaged from the trap dip. The probe point shall be elevated to approximately the water surface corresponding to a full trap seal. Water shall be poured slowly in well until slight overfill is indicated by dripping from the bowl outlet. When dripping ceases, the probe shall be adjusted so that the point is at the water surface. The corresponding scale value, h_2 shall be observed. Calculate full trap seal depth by

$$H_f = h_2 - h_1$$

[2]For bowls with jet opening above trap dip, measure residual trap seal depth by the amount of back pressure required to cause air to pass through the seal. This procedure may yield results of approximately ±6 mm (1/4 in.).

TABLE 1 TEST PRESSURES FOR LABORATORY TESTS FOR WATER CLOSETS[1,2,3]

Para.	Test	All Tank Type[4] (Static)	Flushometer Siphonic [Note (2)]	Valve Type Blowout [Note (2)]
7.1.3.1	Ball	20 (140 kPa)[2]	15 (105 kPa) *F*	25 (175 kPa) *F*
7.1.3.2	Granule	20 (140 kPa)[2]	15 (105 kPa) *F*	25 (175 kPa) *F*
7.1.4.1	Ink	20 (140 kPa)[2]	15 (105 kPa) *F*	25 (175 kPa) *F*
7.1.5.1	Dye	20 (140 kPa)[2]	15 (105 kPa) *F*	25 (175 kPa) *F*
7.1.6.1	Flush Volume and Cycle Time	20 (140 kPa)[2]	15 (105 kPa) *F*	35 (240 kPa) *F*
		50 (350 kPa)[2]	50 (350 kPa) *S*	50 (350 kPa) *S*
		80 (550 kPa)[2]	80 (550 kPa) *S*	80 (550 kPa) *S*
7.1.7.1	Drainline	20 (140 kPa)[2]	15 (105 kPa) *F*	25 (175 kPa) *F*

GENERAL NOTE: Set Pressure(s), psi (kPa)

NOTES:
(1) The test shall be conducted at the measured static or peak flow rate as indicated. Flowing pressures shall be measured with the calibration stop valve (11) in place and the flushometer valve not in place.
(2) Where a minimum operating pressure is required of a fixture by a manufacturer, that minimum pressure shall be substituted for this value. This minimum operating pressure shall be required to be placed on product literature and product packaging.
(3) *S* shall mean static pressure and *F* shall mean flowing pressure.
(4) All gravity and pressurized flushing devices shall be tested using this column.

(3) Report. The values of h_1, h_2, and H_f described above shall be reported in Table A-6.

(b) Performance Requirement. The trap seal shall assure protection against suction and back pressure in the sanitary drainage system and against destruction from evaporation during normal periods of non-use. A full seal depth not less than that specified in ASME A112.19.2M shall be deemed adequate to satisfy this requirement.

7.1.6.3 Trap Seal Restoration

(a) Test Method

(1) Procedure. When making the test specified in paras. 7.1.3.1, 7.1.3.2, and 7.1.6.1, observations for trap seal restoration shall be made after flushing. The appearance of overflow in the drain following the main flush shall be a sufficient indication of adequate trap seal restoration. If no overflow is observed, residual trap seal depth shall be measured by the procedure described in para. 7.1.6.2(a), omitting the addition of water to the well. The residual trap seal depth shall be calculated by

$$H_r = h_3 - h_1$$

(see Fig. A-4).

(2) Report. If afterflow is observed following each initial flush in the specified tests shall be reported. Measured residual trap seal depth shall be reported if no afterflow is observed. See Table A-6 for an acceptable format.

(b) Performance Requirement. Residual trap seal (average of each multiple-run test set) shall be not less than the values given in ASME A112.19.2M as applicable.

7.1.7 Drainline Transport Characterization Procedure

7.1.7.1 Test Method

(a) Apparatus (see Fig. A-7). An assembly shall be made using a minimum of 60 ft of 4 in. I.D. clear, rigid plastic or glass pipe connected directly to a 4 in. plastic 1/4 bend, in accordance with ASTM D 3311, or an I.O. Schott (Kimax) glass 4 in. bend center elbow using hubless coupling or solvent cement as applicable. The elbow shall be connected directly to the floor flange. The pipe shall run backward from the water closet and shall be adequately supported to provide a straight run having a 2% slope. For back outlet water closets, the drain shall be extended up from the floor level using fittings complying with ASME A112.6.1 or using 4 in. plastic DWV piping and a sanitary tee so that the water closet outlet is at the manufacturer's recommended height above the floor.

(b) Procedure and Setup

(1) Water supply and general conditions shall follow the recommendations described in para. 7.1.2 unless otherwise specified.

(2) Procedure. Using the 100 polypropylene balls described in para. 7.1.3.1 place the balls in the bowl.

SAMPLE CALCULATION TABLE

Category	First Run	Second Run	Third Run	Total Balls 3 Runs	Average Distance Traveled	Weighted Carry Distance
In Bowl	5	2	7	14	× 0 ft	0 ft
0–10 ft	14	22	15	51	× 5 ft	255 ft
10–20 ft	8	9	6	23	× 15 ft	345 ft
20–30 ft	5	2	4	11	× 25 ft	275 ft
30–40 ft	2	0	3	5	× 35 ft	175 ft
40–50 ft	5	8	2	15	× 45 ft	675 ft
50–60 ft	9	12	7	28	× 55 ft	1,540 ft
Out Pipe	52	45	56	153	× 60 ft	9,180 ft
			Total number of balls:	300		
					Total carry of all balls:	12,445 ft
					Avg. carry distance per ball:	41.5 ft

GENERAL NOTES:
(a) This Table shows a sample calculation using hypothetical data.
(b) An optional reporting table, which is subdivided in smaller increments, is found in Table A-7.

Flush the bowl observing the distance of travel of each exiting ball. Remove all test media from the fixture and the pipe before beginning the next cycle.

(c) Data, Reporting, and Calculation. To arrive at an overall measure of performance, the location of the balls after flushing shall be recorded in one of eight categories which represent various distances of travel down the drainline. These categories shall include those balls that remain in the bowl or trapway, those that exited the 60 ft length of pipe, and one category for each 10 ft increment of pipe (0–10 ft, 10–20 ft, etc.).

After the initial flush, the number of balls in each of the categories described above shall be counted and recorded. Then the procedure in para. 7.1.8.1(b) shall be repeated three times, recording the same data from each initial flush.

To calculate the weighted carry distance, first the data in the same categories shall be added together for all three runs to get the total number of balls in each category. Then the total number of balls in each category shall be multiplied by the average distance traveled as indicated below.

Any balls remaining in the bowl or trap shall be considered to have traveled zero distance. Balls in a 10 foot segment of pipe shall be considered to have traveled the average distance of that 10 ft segment of pipe from the trapway. (Example: balls in the 10–20 ft segment are assumed to have traveled 15 ft.) Any balls that exit from the 60 ft length of pipe shall be considered to have traveled 60 ft.

The average carry distance shall be the weighted carry distances divided by the total number of balls (3 runs × 100 balls = 300 balls total).

7.1.7.2 Performance Requirement. The average carry distance (total carry of all balls divided by the total number of balls) shall be 40 ft or greater.

7.1.8 Water Rise Test

7.1.8.1 Test Method

(a) Apparatus. A 0.25 in. diameter vertically positioned rod shall be held in a mounting bracket which is supported on the rim. The bottom end of the rod shall be at an elevation 3 in. below the flood level of the rim.

(b) Procedure. The rod shall be located over the highest point at the entrance to the trapway. (See Fig. A-4) The bowl shall be flushed and observe whether the water surface touches the rod. One trial at each pressure shall be sufficient.

(c) Report. If the bowl water touches the rod this shall be reported. Rim wash, drops, and mist shall be excluded.

7.1.8.2 Performance Requirement. The water shall not touch the rod.

NOTE: This test shall be run at 20 and 80 psi static.

TABLE 2 TEST PRESSURES FOR LABORATORY TESTS FOR URINALS

Para.	Test	Pressure(s) psi (kPa)
8.3	Rim Wash	25 (175 kPa)
8.4	Water Change	25 (175 kPa)
8.5	Water Consumption	25, 80 (175, 550 kPa)

7.1.9 Rim Top and Seat Fouling Test

7.1.9.1 Test Method

(a) Apparatus (see Fig. A-6). A 20 in. × 20 in. × 1/4 in. clear plate shall be used to conduct this test. Four 3/8 in. thick spacers shall be used to support the plate 3/8 in. above the rim.

(b) Procedure. The spacers and plate shall be placed on the rim of the bowl.

(c) Report. The bowl shall be flushed and note if bowl water splashes the plate. Any drops or mist shall be disregarded. Five trials at each pressure shall be run.

7.1.9.2 Performance Requirement. Water splash shall not contact the plate of any of five trials. For each pressure, if there is a failure on one trial, five additional trials shall be run. Any splash on any additional trial shall constitute a rejection.

NOTE: This test shall be run at 20 and 80 psi static.

8 URINAL TESTS

8.1 General

This Section presents test methods and performance requirements for urinals with respect to rim wash, waste removal, and water consumption. These test methods and performance requirements shall apply to all urinals.

8.2 Test Apparatus and General Instructions

The principal features of the test apparatus are shown in Fig. A-2B. Preparations and general instructions for testing shall be as follows.

8.2.1 Before connecting and testing urinals, the water supply shall be standardized in accordance with the Procedure For Standardizing Water Supply System for Testing Flushometer Type Fixtures, with Fig. A-2B and the General Notes for A-2B of Appendix A.

8.2.2 The urinal shall be plumb, the trap and outlet clear, and if applicable, the urinal shall be filled to trap weir level before making each test run.

8.2.3 At the flowing pressure specified for the individual test, the stop valve shall be adjusted in accordance with the Procedure for Standardizing Water Supply System for Testing Flushometer Type Fixtures, with Fig. A-2B and General Notes for Fig. A-2B. Test pressures for urinals shall be set in accordance with Table 2.

8.2.4 The flush device shall be tripped and released in a normal manner.

8.2.5 The results shall be evaluated and reported in accordance with the detailed procedures specified for each test in 8.3 through 8.5.

8.3 Washing of Flushing Surface (Rim Wash)

8.3.1 Ink Test

8.3.1.1 Test Method

(a) Test Media[1]. The test media shall be applied by an artist's felt-tipped pen containing a contrasting-colored, water soluble ink.

(b) Procedure. The flushing surface shall be scrubbed clean with commercial scouring powder to remove any build-up of deposits on the walls. The surface shall be rinsed and then dried with oil-free air. A horizontal line shall be inked at a level, one-third the distance below the lowest point of the flushing rim on the back wall of the urinal to the top of the water surface and this line shall extend to 50% of the distance along the interior side wall. Where the interior side wall is not defined by a reverse draft molding, a reference line shall be drawn from the front of the spreader down to the top rear of the urinal lip to the point where it merges with the shield. The flush device shall be tripped and released. When the trap refill cycle is completed, the lengths of the unwashed line segments shall be measured where the ink remains on the flushing surface. This shall complete one test run. The procedure shall be repeated until three sets of data are obtained.

(c) Report. The number and lengths of ink line segments remaining shall be reported using Table A-10.

8.3.1.2 Performance Requirement. The total length of ink line segments remaining on the flushing

surface after each flush shall not exceed 1 in. (25 mm). No individual segment shall be longer than 1/2 in. (13 mm) based on the average of the three test runs.

8.4 Removal of Waste Liquids (Water Change)

8.4.1 Dye Test

(a) Test Method

(1) Five (5) grams of methylene blue powder shall be added to one (1) L of water and mixed thoroughly in a clean container.

(2) The clean urinal under test shall be flushed once and allowed to complete its filling cycle. Thirty (30) ml of the dye solution shall be added to the water in the urinal and mixed thoroughly.

(3) Ten (10) ml of this solution shall be removed from the urinal and shall be added to 1,000 ml of clean water in a suitable container (i.e.: dilution ratio of 100:1). A sample of this solution shall be set aside in a test tube or comparator vial as the control sample.

(4) The urinal shall then be flushed several times to ensure that all traces of the dye solution are removed. Thirty (30) ml of the dye solution [(1) above] shall be added to the urinal. The flush device shall be tripped and released in a normal manner and the test fixture shall be allowed to complete its filling cycle. A test tube or comparator vial shall be filled with water from the urinal and compared against the control sample. The test shall be repeated two additional times and the results shall be averaged. Table A-9 is an acceptable recording chart for these data.

NOTE: Use of a spectrophotometer shall be permitted to be used in cases of doubt; however, this method shall necessitate the use of a different color dye.

(b) Performance Requirement. A dilution ratio of at least 100 shall be obtained in each initial flush, for the average of the three tests. The procedure shall be repeated until three sets of data are obtained.

8.5 Water Consumption Test

The measurement of consumption shall only be necessary for water-saving and low-consumption urinals.

(a) Test Method

(1) Apparatus. The test apparatus shall be assembled. A suggested method is shown in Fig. A-1. The receiving vessel shall be permitted to be tested with either a vessel calibrated in volume increments not exceeding 0.1 gal. (0.4 L) or with the use of a load cell with readouts in increments not exceeding 0.1 gal. (0.4 L).

(2) Procedure. The static pressure shall be observed, then the flush release device shall be tripped. The flow pressure (miminum value) shall be observed. Peak flow rates as indicated by the flow meter shall also be observed.

When the main flush is completed, as indicated by cessation of the trailing flow which occurs at the end of the principal discharge, the volume received in the vessel (main flush volume) shall be observed. Again the volume (total flush volume) shall be observed after cessation of flow of the excess trap refill water (after flow) occurs, subsequent to the first observation. The amount of excess trap refill (after flow) shall be determined by subtracting the main flush volume from the total flush volume. Trap seal restoration shall be measured (see 7.1.6.3 for procedure). This shall complete one test run.

The procedure shall be repeated until three sets of data are obtained for each test pressure specified in Table 2.

(3) Report. Static pressure, peak supply flow rate, minimum flow pressure, main and total flush volume, and after flow shall be reported in a format similar to Table A-5 and Fig. 5.

(b) Performance Requirements

(1) The average water consumption (total flush volume) of low-consumption urinals over the range of test procedures specified in Table 2 for para. 8.5 shall not exceed 1.0 gal. (3.8 L).

(2) The average water consumption (total flush volume) of water-saving urinals over the range of test pressures specified in Table 2 for para. 8.5 shall not exceed 1.5 gal. (5.7 L).

9 PERFORMANCE TEST METHODS FOR ALTERNATIVE ELECTRO/MECHANICAL/ HYDRAULIC ASSIST PLUMBING FIXTURES

9.1 Purpose

The purpose of the test methods and requirements of this Section shall be to provide for substitution of the prescribed test media and methods of evaluation and to permit the use and application of alternatives when the materials are not applicable or suitable to the particular fixture and device undergoing evaluation.

9.1.1 Responsibility. The burden of demonstration shall be placed upon the manufacturer and/or test laboratory to ensure that the alternative materials and methods conform to the intent of this Standard and shall be guided by the following requirements.

(a) Test results with substitute materials shall be demonstrated for at least two plumbing products which have passed tests in Section 7 or 8 for the same purposes.

(b) All measures of performance with the substitute materials shall be fulfilled within 5% (±) of the values obtained with the prescribed test materials in the same conventional fixtures, as stated elsewhere in this Standard, in conducting (a).

For each deviation of the test procedure from other sections of this Standard a written protocol, in any format, shall be prepared and made a permanent part of the test record and test report for demonstrating conformance to this Standard.

9.2 Test Media

The test media prescribed in other sections of this Standard represent commonly used materials or media provided for test purposes which have been made available and have been found to be generally consistent and reproducible. Further, the media tend to be recoverable, measurable, reusable, and correlate from test to test to provide reproducible results. However, because the media do not necessarily directly simulate human waste characteristics, some plumbing products of special design and unique operation which are designed to connect to conventional D-W-V systems shall be evaluated with alternate test materials.

9.2.1 Alternate Materials. Alternate media used to conduct the ball, granule, and transport drainline carry tests shall be of equivalent (within 5%) count, volume, and weight (when thoroughly saturated).

9.2.2 Reducible Materials. Where friable and/or frangible and/or breakup of solid media are required for the testing to be accomplished, separate, individual loadings for each of the test materials for each independent step of the operation shall be adopted for the performance tests. Complete, full loadings, as cited above, shall be required for each step of the process and no partial loads shall be permitted.

APPENDIX A
WASTE REMOVAL AND WATER CONSUMPTION

(This Appendix is not part of ASME A112.19.6 1995. This Appendix relates to Sections 7 and 8 and comprises two sections. The first Section, A.1, shows suggested apparatus and reporting formats and gives required procedures for standardizing the water supply system before making test. The second Section, A.2, describes certain optional tests.)

A 1 SUGGESTED APPARATUS AND REPORTING FORMATS FOR HYDRAULIC TESTS FOR WATER CLOSETS

The depiction of suggested apparatus and data reporting formats (see Figs. A-1 through A-6, Tables A-1 through A-11) and the provision of a method for standardizing the water supply system will facilitate preparation for testing and contribute to uniformity in obtaining and reporting of test results.

It should be recognized that other apparatus and reporting formats having similar features could be used to attain essential objectives.

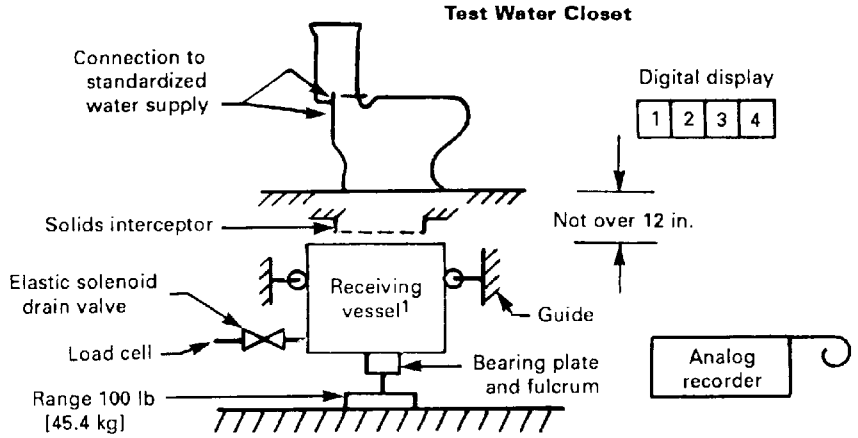
A 2 SPECIAL TEST PROCEDURES

Except as specified by reference, the tests described in this Section are not mandatory but are worthy of consideration in development of future designs and in the evaluation of hydraulic performance of plumbing systems.

A 2.1 Hydraulic Profile (Optional)

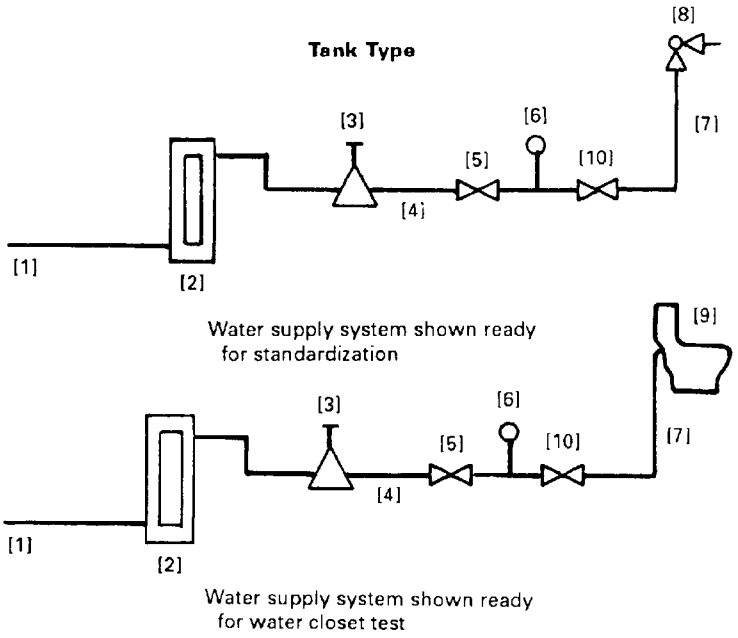
A 2.1.1 Test Method

(a) Procedure. When making the required hydraulic



NOTE:
Cylindrical, dia. 12 in to 16 in. (304 to 406 mm), depth 20 in. to 24 in. (508 to 610 mm), max tare 20 lb (9.1 kg). An impact inhibitor suspended below and attached to the soils interceptor may be helpful.

FIG. A-1 DIAGRAM DEPICTING SUGGESTED APPARATUS FOR MEASURING WATER CLOSET FLUSH VOLUME AND FOR INTERCEPTING SOLIDS (Applicable to paras. 7.1.3.1, 7.1.3.2, and 7.1.6.1)



GENERAL NOTE: Many products are available for building this test facility. The manufacturers mentioned are for convenience only and mention does not constitute an endorsement.

(1) *Water Supply.* Water for testing shall be potable and preferably from the general laboratory source. A minimum supply pressure of 125 psig (860 kPa) is recommended. NOTE: A filter may be required to remove particles and contaminants from the water supply which may interfere with the operation of the system or water closet under test.
(2) *Flow Meter.* The flow meter shall cover the range at 0 to 10 gpm (0 to 37.9 Lpm) and have an accuracy or 2% of full scale. Variable area and turbine meters are among those recommended.
(3) *Regulator.* The pressure-reducing valve shall cover the range of 20 to 80 psig (140 to 550 kPa) and have a capacity not less than 10 gpm (37.p Lpm) at a falloff pressure of a 5 psig (40 kPa). Watts Regulator Company, Model 223, 3/4 size has been found acceptable for closet tank testing (although its published range is 25-75 psi as per ASSE 1003).
(4) *Supply Piping.* Recommended 3/4 in. (19 mm) diameter pipe or tubing for tank closet testing.
(5) Valve. The control valve shall be commercially available 3/4 in. (19 mm) globe valve or equivalent to facilitate throttling.
(6) *Pressure Gage.* The pressure shall have a range of 0 to 100 psig (0 to 690 kPa) and have 1 psig (10 kPa) divisions. Accuracy shall not be less than 2% of full scale.
(7) *Flexible Hose.* Flexible hose are recommended for connecting the standardized supply to the fixture supply assembly. The hose shall be 5/8 in. (16 mm) inside diameter.
(8) *Stop Valve.* The stop valve simulating a fill valve (ballcock) shall be nominal 3/8 in. (10 mm) size. Brass Craft Model R-15 has been found adequate.
(9) *Water Closet Under Test.* Complete with tank and fill valve (ballcock).
(10) *Ball or Gate Valve.* Used for ON–OFF control (3/4 in. dia.).

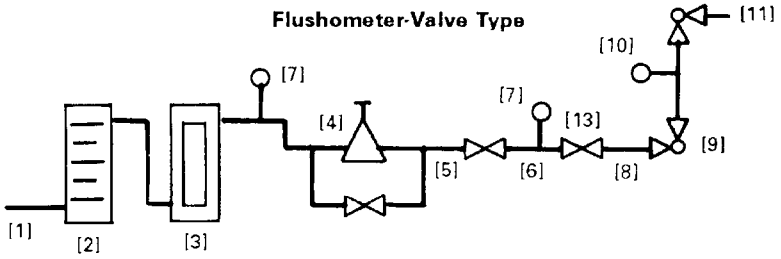
FIG. A-2A REQUIRED STANDARDIZATION OF WATER SUPPLY FOR TESTING GRAVITY TANK OPERATED-TYPE WATER CLOSETS

tests specified in 7.1.6.1, data shall be obtained defining hydraulic profiles.

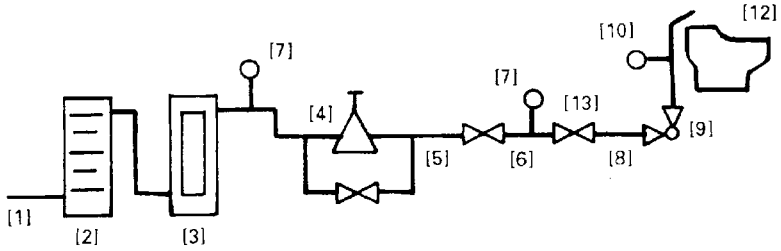
(1) Water Supply. Water consumption, fill valve (ballcock) or flushometer (pfd) pressure drop, cycle time, and maximum supply flow for each supply pressure.

(2) Drainage. Accumulated volume discharged as function of time and peak discharge rate for each supply pressure.

Prepare graphs from the data described in (1) and (2) above. The values plotted shall be the averages from three replicate runs at each supply pressure.



Water supply system shown ready for standardization



Water supply system shown ready for water closet test

GENERAL NOTE: Many products are available for building this test facility. Manufacturers mentioned are for convenience only, and mention does not constitute an endorsement.

(1) *Water Supply.* Water for testing shall be potable and preferably from the general laboratory source. A minimum supply pressure of 125 psig (860 kPa) is recommended. The test system shall be thoroughly flushed before conducting any test. The system shall be flushed ten (10) times to purge any air from the flushometer. NOTE: An accumulator tank or pipe may be necessary to achieve the desired conditions.

(2) *Filter.* A filter shall be provided where required to remove particles and contaminates from the water supply which may interfere with the operation of the system or water closet under test.

(3) *Flow Meter.* The flow meter shall cover the range at 0 to 60 gpm (0 to 227.1 Lpm) and have an accuracy or 2% of full scale. Rotameters and turbine meters are among those recommended.

(4) *Regulator.* The pressure-reducing valve shall cover the range of 20 to 80 psig (140 to 550 kPa) and have a capacity not less than 50 gpm (189.e Lpm) at a falloff pressure of a 5 psi (40 kPa). Watts Regulator Company, Model 223, 2 in. (50 mm) size has been found acceptable for flushometer closet testing. The bypass is optional. It is advisable to consider a second regulator in the series to provide a controlled inlet pressure.

(5) *Supply Piping.* 1 1/2 in. (38 mm) diameter pipe or tubing is recommended for flushometer closet testing.

(6) *Valve.* The control valve shall be commercially available 1 1/2 in. (38 mm) ball valve so as to have full bore flow in the ON position.

(7) *Pressure Gage.* The pressure gage shall have a range of 0 to 100 psi) to 690 kPa) and 1 psi (10 kPa) divisions. Accuracy shall not be less than 2% of full scale.

(8) *Flexible Hose.* Flexible hose are recommended for connecting the standardized supply to the fixture supply assembly. The hose shall be 1 1/4 in. (32 mm) inside diameter.

(9) *Fixture Supply Valve.* The stop valve simulating field piping shall be nominal 1 in. (25 mm) globe valve.

(10) *Pressure Gage.* The pressure gage shall have a range of 0 to 100 psi (0 to 690 kPa) and 1 psi (10 kPa) divisions. Accuracy shall be not less than 2% of full scale.

(11) *Stop Valve.* The stop valve simulating the flushometer valves shall be nominal 1 in. (25 mm) size. Stop valves accompanying the flushometer valves shall be permitted.

(12) *Water Closet Under Test.* Complete with flushometer.

(13) The ON–OFF control valve shall be a commercially available 1 1/2 in. ball valve so as to have full bore in the ON position.

FIG. A-2B REQUIRED STANDARDIZATION OF WATER SUPPLY FOR TESTING FLUSHOMETER-VALVE WATER CLOSETS AND URINALS

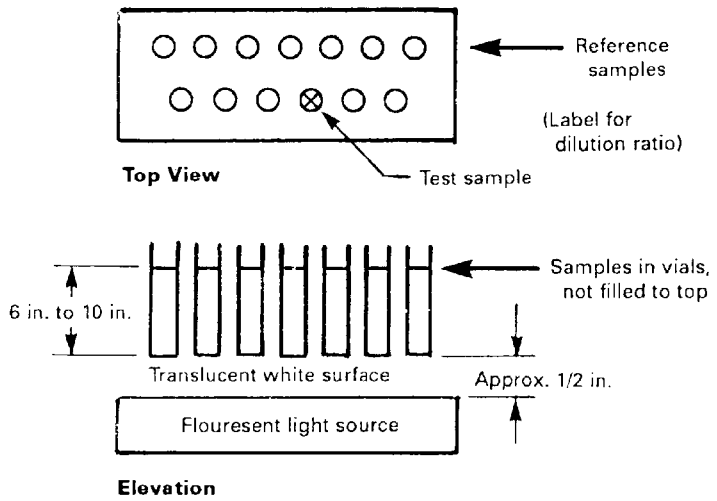


FIG. A-3 DIAGRAM DEPICTING SUGGESTED APPARATUS FOR DETERMINING RATIO OF DYE CONCENTRATION IN WATER CLOSET BOWL BEFORE FLUSHING TO THAT OF AFTER FLUSHING (DILUTION RATIO) [Applicable to paras. 7.1.5.1(a) and 8.4.1]

(b) Report. Report the data described above in graphic format. See Fig. A-5 for an acceptable format.

A 2.1.2 Performance Requirement. No specific requirements are set at this time. However, the data are needed in connection with evaluating certain water conservation parameters and interaction parameters affecting overall plumbing system performance and fixture-unit loads. This may be of special importance as future designs are developed.

A 2.2 Complete Removal of Waste Solids (Optional). In the test for waste solids removal (7.1.3.1, 7.1.3.2), it is not required that the number of flushes necessary to remove all solids from the well and trapway before each replicate test run be reported. However, such data may be useful in assessing the potential for "multiple flushing" and can easily be reported in the columns of Table A-1 and A-2, entitled "Number of Additional Flushes, If Any, Required to Flush All Balls Out," and "Remove all Granules From Bowl," respectively.

A 2.3 Paper Test for Waste Removal (Field Test for Plumbing Inspector Use)

A 2.3.1 Toilet Paper Test

(a) Test Method[1]

(1) Test Media. The test load shall be comprised of an appropriate number of six-sheet strips of single-ply roll toilet paper, each crumpled into a loose ball measuring 2 to 3 in. (50 to 75 mm) in diameter. The number of six-sheet strips comprising the test load shall be either 5, 6, or 7, depending on paper absorption time.

The standard sheet size to be used in this test is $4^1/_2 \times 4^1/_2$ in. (114 × 114 mm). If a smaller or larger size is used, the load shall be increased or decreased proportionately, based on the surface area per sheet.

(2) Procedure

(a) Determine the number of six-sheet strips of paper to comprise the test load in accordance with absorption time as follows:

Paper Absorption time (seconds)	0 to 3	4 to 6	7 to 15
Number of crumpled strips	7	6	5

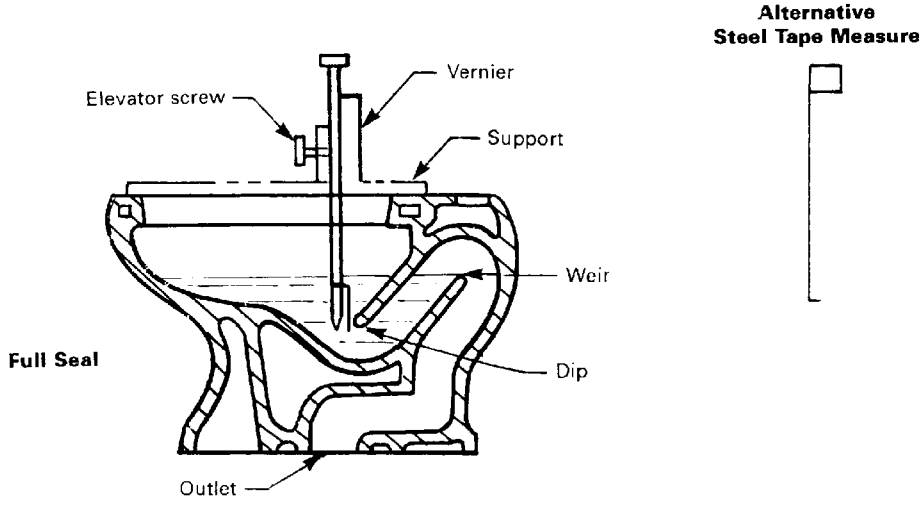
Absorption time shall be determined as follows:

(1) To determine the absorption time of roll toilet paper by the double-strip method, take two-sheet strips of paper and place them together, with perforations in line, and with curvature from roll in same direction to insure uniform contact.[2]

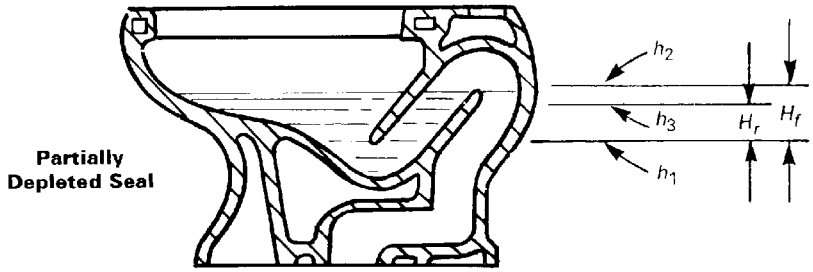
(2) Place these two strips gently on the surface of the water with convex side of paper down. Record the time in seconds from the moment the paper touches the water until a spot of moisture approximately $^1/_8$ in. (3 mm) in diameter appears on the

[1] If interfold (pack-type) paper is used, crumple six sheets into a ball in place of each six-sheet strip of roll paper, and make the test as outlined for roll paper.

[2] Determine the absorption time of interfold (pack-type) paper in the same manner as for roll toilet paper after first cutting the interfold sheets where folded, then placing the two sheets on the surface of the water.



(a) Apparatus



(b) Measurements Required

FIG. A-4 DIAGRAM DEPICTING SUGGESTED APPARATUS FOR TRAP SEAL DEPTH DETERMINATION FOR WATER CLOSET (Applicable to para. 7.1.6.3)

upper strip. Ignore spots appearing through imperfections in the paper at the edges. (This test can best be made in lavatory or sink where lighting is usually better than in the closet bowl).

(b) Determine static pressure.

(c) Adjust tank components or flushometer (pfd) according to specifics of 7.1.2.3 when used as a laboratory test or the manufacturer's instruction for a field test.

(d) Crumple the given number of six-sheet strips of roll toilet paper, as determined by absorption time, into loose balls measuring 2 to 3 in. (50 to 75 mm) in diameter, and drop all together as a "test load" into the bowl and flush the bowl immediately.

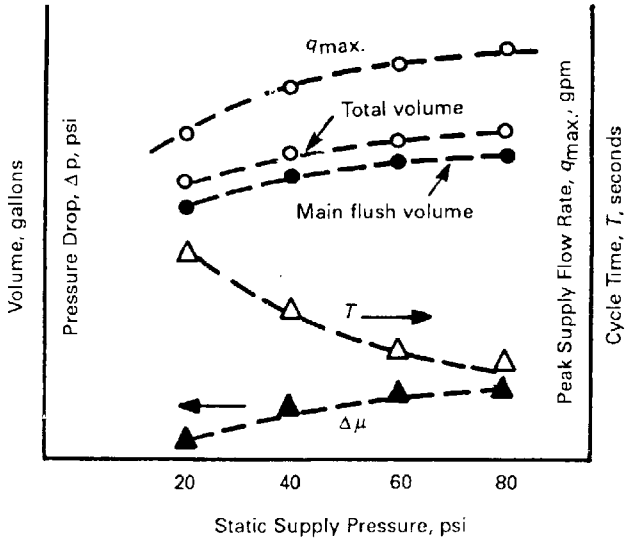
(e) After completion of this initial flush, observe whether any test media remain in the well.

(f) Repeat procedures (*d*) and (*e*) above until five sets of data are obtained.

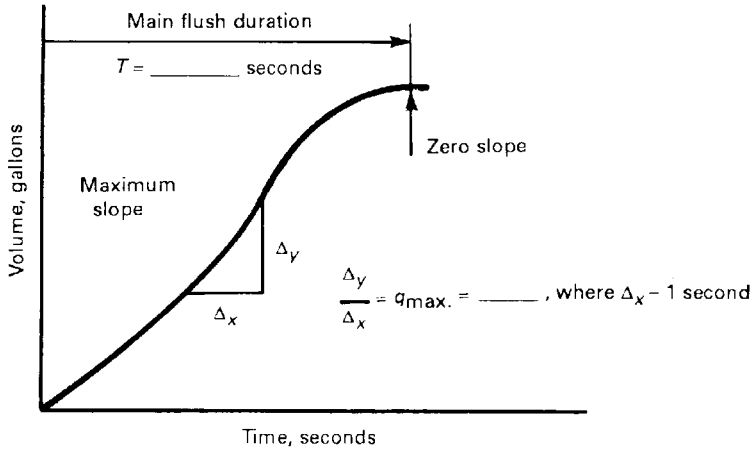
(3) Report. Report static pressure and whether all paper is removed from well in each initial flush. See Table A-3 for an acceptable format.

(b) Performance Requirement. If a paper field test is required, no paper shall remain in the well after each initial flush.

NOTE: Failure of this test may indicate a problem with the drainage or venting system and does not necessarily indicate a problem with the fixture.



(a) Hydraulic Profile-Water Supply



(b) Hydraulic Profile-Drainage

FIG. A-5 SUGGESTED FORMAT FOR REPORTING HYDRAULIC PROFILE DATA (WATER CLOSET) (Applicable to para. 7.1.6.1)

A 3 PROCEDURE FOR STANDARDIZING WATER SUPPLY SYSTEM FOR TWO-PIECE TESTING GRAVITY TANK-TYPE WATER CLOSETS (See Fig. A-2A)

(a) The purposes of this standardization procedure are to establish the system capacity at the minimum test pressure which simulate the maximum piping resistance allowed in field installation.

(b) Pressure regulator (3) shall first be set to provide the reduced static pressure of 20 psig (140 kPa).

(c) Valves (5) and (8) shall be adjusted to establish a flow of 3.0 gpm (11.4 Lpm) with 8 psig (60 kPa) flowing pressure at gage (6). Valve (10) shall be fully open, except when used to shut off the flow completely.

(d) After establishing the specified flow conditions,

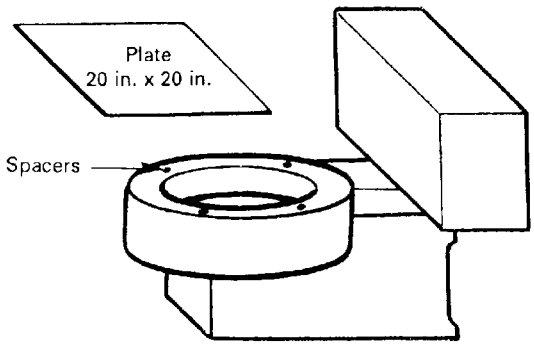


FIG. A-6 TEST PLATE (Applicable to para. 7.1.9.1)

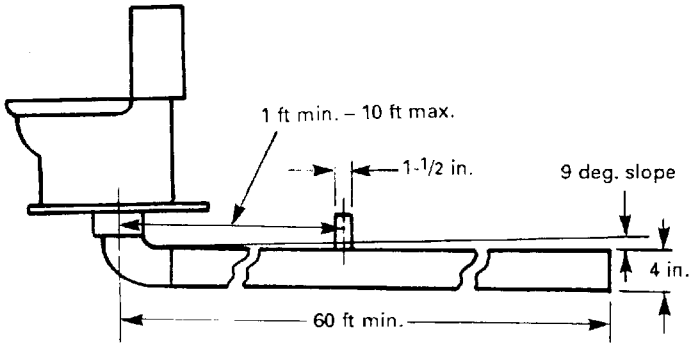


FIG. A-7 DRAINLINE TRANSPORT CHARACTERIZATION TEST ASSEMBLY

valve (8) shall be removed and the test water closet installed. The settings of valve (5) shall not be changed during the testing.

A 4 PROCEDURE FOR STANDARDIZING WATER SUPPLY SYSTEM FOR TESTING FLUSHOMETER (PRESSURIZED FLUSHING DEVICE) - TYPE WATER CLOSETS (See Fig. A-2B)

(a) The purposes of this standardization procedure are to establish adequate system capacity at the minimum test pressure and to simulate piping resistance typical of field installations.

(b) Pressure regulator (4) shall first be set to provide the static pressure, 25 psi (170 kPa) for siphonic units and 35 psi (240 kPa) for blowout bowls.

(c) Valves (6), (9), and (11) shall be adjusted to establish a flow of 35 gpm (132.5 Lpm) with 15 psi (100 kPa) flowing pressure at gage (10) and 20 psi (140 kPa) flowing pressure at gage (7) for siphonic units. Valves (6), (9), and (11) shall be adjusted to establish a flow of 50 gpm (189.3 Lpm) at 25 psi (170 kPa) flowing pressure at gage (10) and 30 psi (210 kPa) flowing and 30 psi (210 kPa) flowing pressure at gage (7) for blowout units. Valve (11) shall be fully open except when used to completely shut off the flow.

(d) After establishing the specified flow condition, valve (11) shall be removed and the test water closet and flushometer installed. No changes to the standardized water supply system shall be made except to run tests requiring fifty (50) and eighty (80) psig static. The setting of valves (6) and (9) shall not be changed during testing.

(e) When testing at fifty (50) and eighty (80) psi static pressures, the pressure shall be raised to the specified value as measured at gauge (7).

TABLE A-1 SUGGESTED FORMAT FOR REPORTING RESULTS OF BALL TEST (Static Pressure as specified in Table 1)

Test Run No.	Status of Balls After Initial Flush			No. of Additional Flushes, If any, Required to Flush All Balls Out	Trap Seal Automatically and Fully Restored After Flushing [Note (1)]	
	No. Flushed Out	No. Remaining in Bowl	No. Remaining in Trapway		Yes	No
1						
2						
3						
4						
5						
Avg. values						

NOTE:
(1) As evidenced by appearance of afterflow, mark "X" in the appropriate box. If seal is not fully restored, measure and report residual depth [see para. 7.1.6.2(a) and Table A-6].

TABLE A-2 SUGGESTED FORMAT FOR REPORTING RESULTS OF GRANULE TEST (Static Pressure as specified in Table 1)

Test Run No.	No. of Granules Remaining in Bowl After Initial Flush	No. of Additional Flushes, if any, Required to Remove All Granules from Bowl	Trap Seal Automatically and Fully Restored After Flushing	
			Yes	No
1				
2				
3				
4				
5				
Avg. values				

TABLE A-3 SUGGESTED FORMAT FOR REPORTING RESULTS OF INK TEST (para. 7.1.4.1) (Static Pressure as specified in Table 1)

Test Run No.	Status of Ink Line After Initial Flush			Total Length of Segments Remaining, in.
	No. of Segments	Position of Maximum Segment in Bowl, Quadrant [Note (1)]	Maximum Individual Length, in.	
1				
2				
3				
Avg. values				

NOTE:
(1) Quadrant numbering scheme.

TABLE A-4 SUGGESTED FORMAT FOR REPORTING RESULTS OF DYE TEST ON WATER CLOSETS OR URINALS (para. 8.4.1)
[Pressure as specified in Table 1 (Water Closets) or Table 2 (urinals)]

Test Run No.	Dilution Ratio
1	
2	
3	
Avg.	

TABLE A-5 SUGGESTED FORMAT FOR REPORTING RESULTS OF FLUSH VOLUME AND CYCLE TIME TEST ON WATER CLOSETS (para., 7.1.6.1)
(Pressure as specified in Table 1)

Pressure, psi	Test Run No.	Flow Pressure, psi	Supply flow rate, gpm	Cycle time, min	Flush Volume			Trap Seal Automatically and Fully Restored After Flushing	
					Main Flush, gal	After-flow gal [Note (1)]	Total flush, gal	Yes	No
20	1								
	2								
	3								
Avg. values									

TABLE A-6 SUGGESTED FORMAT FOR REPORTING OBSERVATIONS ON TRAP SEAL RESTORATION AFTER FLUSHING (PARA. 7.1.6.2)

Source of Observations		Trap Seal Fully Restored After Flushing [Note (1)]	
Para.	Test		
7.1.3.1	Ball	Yes	No; residual depth, [Notes (2), (3)] $H_r = h_2 - h_1$, in.
7.1.3.2	Granule		
7.1.6.1	Flush volume and cycle time		

NOTES:
(1) As evidenced by the occurrence of afterflow (see Tables A-1, A-2, A-3, and A-7).
(2) Residual depths to be reported are the average of the corresponding test sets. See Fig. A-4.
(3) Also report here the static pressure associated with each data set showing trap seal depiction.

TABLE A-7 TABLE REPORTING DRAINLINE CARRY PERFORMANCE EVALUATION

Test # **Test Unit:**
Supply Test Pressure =___ psi
Average Consumption/flush =___ Gal. (U.S.) [Note (1)]
Average Ball Travel =___ ft. lost

Category	1st Run	2nd Run	3rd Run	Total Balls 3 Runs	Average Distance Traveled	Weighted Carry Distance
In bowl						
0–10 ft						
10–20 ft						
20–30 ft						
30–40 ft						
40–50 ft						
50–60 ft						
Out Pipe						
	Total Number of Balls:					
					Total Carry of all Balls:	
					Avg. Carry Distance per Ball:	

NOTE:
(1) Average of Consumption of (2) flushes at 20, 50, 80 psi per Table 1

TABLE A-8 RIM TOP AND SEAT FOULING TEST (para. 7.1.9)[1]

	Test Run				
Pressure	**1**	**2**	**3**	**4**	**5**
20 psi					
80 psi					

NOTE:
(1) Mark "X" if splash occurs per direction in Section 7.1.9.

TABLE A-9 SUGGESTED FORMAT FOR REPORTING RESULTS OF INK TEST (para. 8.3.1) (Pressure as specified in Table 2)

	Status of Ink Line After Initial Flush			
Test Run No.	**No. of Segments**	**Position(s) in Urinal**	**Individual Segment Length(s), in.**	**Total Length of Segments Remaining, in.**
1				
2				
3				
Avg. values				

TABLE A-10 SUGGESTED FORMAT FOR REPORTING RESULTS OF FLUSH VOLUME AND CYCLE TIME TEST ON URINALS (para. 8.5.1)

Static Pressure, psi	Test Run No.	Max. Minimum Flow Pressure, psi	Supply Flow Rate, gpm	Cycle time, min	Flush Volume			Trap Seal Automatically and Fully Restored After Flushing [Note (1)]	
					Main Flush, gal	After-flow, gal [Note (2)]	Total Flush, gal	Yes	No
20	1								
	2								
	3								
Avg. values									

NOTES:
(1) See procedures, para. 8.5.1.
(2) Repeat for 80 psi (0.55 MPa) flowing pressures.

TABLE A-11 SUGGESTED FORMAT FOR REPORTING RESULTS OF TOILET PAPER FIELD TEST

Test Run No.	Static Pressure, psi	All Paper [Note (1)] Removed From Bowl in Initial Flush	
		Yes	No
1			
2			
3			
4			
5			
Avg.			

NOTE:
(1) Mark "X" in the appropriate box. Paper absorption time = ___ seconds. Number of paper balls in test load = ___.

APPENDIX B
TEST MATERIALS

(This Appendix is not part of ASME A112.19.6-1995, and is included for information purposes only.)

B1 PENS

Water soluble in two colors. Most likely available through a reliable stationery or office store.

B2 DYE

Pylam Products Co., Inc., 1001 Stewart Avenue, Garden City, NY 11530.

B3 POLYBALLS

Precision Plastic Ball Co., 3000 North Cicero, Chicago, Illinois 60641.

B4 GRANULES

Geberit Mfg., Inc., P.O. Box 2008, 1100 Boone Drive, Michigan City, Indiana 46360 (Attn: Mr. Hanslin).

B5 INSTRUCTIONS

Originals in office of Building Technology Laboratory, Department of Civil Engineering.

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Air Gaps in Plumbing Systems A112.1.2-1991
Performance Standard and Installation Procedures for Stainless Steel Drainage Systems for Sanitary, Storm, and Chemical Applications, Above and Below Ground A112.3.1-1993
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Supports for Off-the-Floor Plumbing Fixtures for Public Use A112.6.1M-1990
Backwater Valves ..... A112.14.1-1975(R1990)
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Dual Flush Devices for Water Closets A112.19.10-1994
Enameled Cast Iron Plumbing Fixtures A112.19.1M-1994
Vitreous China Plumbing Fixtures A112.19.2M-1995
Stainless Steel Plumbing Fixtures (Designed for Residential Use) A112.19.3M-1987
Porcelain Enameled Formed Steel Plumbing Fixtures A112.19.4M-1994
Trim for Water-Closet Bowls, Tanks, and Urinals ..... A112.19.5-1979(R1990)
Hydraulic Requirements for Water Closets and Urinals A112.19.6-1995
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