

IAPMO IGC 161-~~2014~~20xx

PUBLIC REVIEW DRAFT

Urinals with Mechanical Traps



IAPMO Standard

IAPMO IGC 161-~~2014~~20yy

Urinals with Mechanical Traps

Published: ~~June 2014~~

Previous editions: May 2009, January 2007, August 2006, June 2006, March 2004, July 2002, July 2000

Published by

International Association of Plumbing and Mechanical Officials (IAPMO)

5001 East Philadelphia Street, Ontario, California, 91761, USA

1-800-854-2766 • 1-909-472-4100

Visit the IAPMO Online Store at: www.IAPMOstore.org

Visit the IAPMO Standards website at: www.IAPMOstandards.org

Copyright © 2000-~~2014~~ by

International Association of Plumbing and Mechanical Officials (IAPMO)

All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior written permission of the publisher.

Printed in the United States of America

IAPMO Notes

- (1) *The use of the singular does not exclude the plural (and vice versa) when the sense allows.*
- (2) *The use of IAPMO Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.*
- (3) *This standard was developed using an open process and in accordance with IAPMO Standards Policy S-001, Standards Development Process, which is available on the IAPMO Standards website (www.IAPMOstandards.org).*
- (4) *During its development, this Standard was made available for public review, thus providing an opportunity for additional input from stakeholders from industry, academia, regulatory agencies, and the public at large. Upon closing of public review, all comments received were duly considered and resolved by the IAPMO Standards Review Committee.*
- (5) *This Standard was developed in accordance with the principles of consensus, which is defined as substantial agreement; consensus implies much more than a simple majority, but not necessarily unanimity. It is consistent with this definition that a member of the IAPMO Standards Review Committee might not be in full agreement with all sections of this Standard.*
- (6) *Although the intended primary application of this Standard is stated in its scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
- (7) *IAPMO Standards are subject to periodic review and suggestions for their improvement will be referred to the IAPMO Standards Review Committee. To submit a proposal for change to this Standard, you may send the following information to the International Association of Plumbing and Mechanical Officials, Attention Standards Department, at standards@IAPMOstandards.org or, alternatively, at 5001 East Philadelphia Street, Ontario, California, 91761, and include "Proposal for change" in the subject line:*
 - (a) *standard designation (number);*
 - (b) *relevant section, table, or figure number, as applicable;*
 - (c) *wording of the proposed change, tracking the changes between the original and the proposed wording; and*
 - (d) *rationale for the change.*
- (8) *Requests for interpretation should be clear and unambiguous. To submit a request for interpretation of this Standard, you may send the following information to the International Association of Plumbing and Mechanical Officials, Attention Standards Department, at standards@IAPMOstandards.org or, alternatively, at 5001 East Philadelphia Street, Ontario, California, 91761, and include "Request for interpretation" in the subject line:*
 - (a) *the edition of the standard for which the interpretation is being requested;*
 - (b) *the definition of the problem, making reference to the specific section and, when appropriate, an illustrative sketch explaining the question;*
 - (c) *an explanation of circumstances surrounding the actual field conditions; and*
 - (d) *the request for interpretation phrased in such a way that a "yes" or "no" answer will address the issue.*
- (9) *Attention is drawn to the possibility that some of the elements of this Standard may be the subject of patent rights. IAPMO is not to be held responsible for identifying any or all such patent rights. Users of this Standard are expressly advised that determination of the validity of any such patent rights is entirely their responsibility.*
- (10) *IAPMO does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this Standard, and does not undertake to insure anyone utilizing this Standard against liability for infringement of any applicable patents, nor assumes any such liability. Users of this Standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their responsibility.*
- (11) *Participation by federal or state agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this Standard.*

IAPMO IGC 161-~~2014~~20yy

Urinals with Mechanical Traps

1 Scope

- 1.1** This Standard covers flushing and non-water-consuming urinals with mechanical traps and specifies requirements for materials, physical characteristics, performance testing, and markings.
- 1.2** The requirements of this Standard are not intended to prevent the use of alternative materials or methods of construction, provided such alternatives meet the intent and requirements of this Standard
- 1.3** In this Standard,
- (a) “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy to comply with the Standard;
 - (b) “should” is used to express a recommendation, but not a requirement;
 - (c) “may” is used to express an option or something permissible within the scope of the Standard; and
 - (d) “can” is used to express a possibility or a capability.

Notes accompanying sections of the Standard do not specify requirements or alternative requirements; their purpose is to separate explanatory or informative material from the text. Notes to tables and figures are considered part of the table or figure and can be written as requirements.

- 1.4** SI units are the primary units of record in global commerce. In this Standard, the inch/pound units are shown in parentheses. The values stated in each measurement system are equivalent in application, but each unit system is to be used independently. All references to gallons are to U.S. gallons.
- 1.5** Proposals for amendments to this Standard will be processed in accordance with the standards-writing procedures of IAPMO.
- 1.6** The user’s attention is called to the possibility that compliance with this Standard might require use of an invention covered by patent rights. By publication of this Standard, no position is taken with respect to the validity of any such claim(s) or of any patent rights in connection therewith. If a patent holder has filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license, then details can be obtained from IAPMO.

2 Reference Publications

This Standard refers to the following publications, and where such reference is made, it shall be to the current edition of those publications, including all amendments published thereto.

ASME A112.19.2/CSA B45.1	Ceramic plumbing fixtures
ASME A112.19.3/CSA B45.4	Stainless steel plumbing fixtures
CSA B45.5/IAPMO Z124	Plastic plumbing fixtures

3 Definitions

The definitions in ASME A112.19.2/CSA B45.1 and the following definitions shall apply in this Standard:

Urinal — a plumbing fixture that receives only liquid body waste and conveys the waste through a trap into a drainage system.

Flushing urinal — a urinal that conveys the waste into the drainage system with the use of water.

Non-water-consuming urinal — a urinal that conveys the waste into the drainage system without the use of water.

4 Requirements for Flushing Urinals

4.1 Ceramic Flushing Urinals

Ceramic flushing urinals with mechanical traps shall comply with

- (a) the applicable requirements and tests specified in ASME A112.19.2/CSA B45.1, with the exception of requirements and tests for liquid traps; and
- (b) Section 6 of this Standard.

4.2 Stainless Steel Flushing Urinals

Stainless steel flushing urinals with mechanical traps shall comply with

- (a) the applicable requirements and tests specified in ASME A112.19.3/CSA B45.4, with the exception of requirements and tests for liquid traps; and
- (b) Section 6 of this Standard.

4.3 Plastic Flushing Urinals

Plastic flushing urinals with mechanical traps shall comply with

- (a) the applicable requirements and tests specified in CSA B45.5/IAPMO Z124, with the exception of requirements and tests for liquid traps; and
- (b) Section 6 of this Standard.

4.4 Enameled cast iron and enameled steel flushing Urinals

Enameled flushing urinal with mechanical traps shall comply with

- (a) the requirements and tests of sections 4, 5.1, 5.2, specified in ASME A112.19.2/CSA B45.1, and
- (b) the requirements and tests of Section 4.7, excluding Section 4.7.4, Section 8 specified in ASME A112.19.2/CSA B45.1 with the exception of requirements and tests for liquid traps; and
- ~~(a)~~(c) Section 6 of this Standard.

5 Requirements for Non-Water-Consuming Urinals

5.1 Ceramic Non-Water-Consuming Urinals

Ceramic non-water-consuming urinals with mechanical traps shall comply with

- (a) the applicable requirements and tests specified in ASME A112.19.2/CSA B45.1; and
- (b) Sections 6 and 7 of this Standard.

5.2 Stainless Steel Non-Water-Consuming Urinals

Stainless steel non-water-consuming urinals with mechanical traps shall comply with

- (a) the applicable requirements and tests specified in ASME A112.19.3/CSA B45.4; and
- (b) Sections 6 and 7 of this Standard.

5.3 Plastic Non-Water-Consuming Urinals

Plastic non-water-consuming urinals with mechanical traps shall comply with

- (a) the applicable requirements and tests specified in CSA B45.5/IAPMO Z124; and
- ~~(b)~~ Sections 6 and 7 of this Standard.

5.4 Enameled Non-Water-Consuming Urinals

Enameled non-water-consuming urinals with mechanical traps shall comply with

- (a) the applicable requirements and tests specified in ASME A112.19.19; and
- (b) Sections 6 and 7 of this Standard.

6 Requirements for Mechanical Traps

6.1 One-Way Sealing Performance Test for Mechanical Traps

6.1.1 Test Apparatus

The test apparatus shall consist of the following:

- (a) several pieces of rubber tube with a 6 mm (0.25 in) bore;
- (b) a tee-junction suitable for use with the rubber tube;
- (c) a U-tube manometer with a range of 0 to 100 mm (0 to 4 in); and
- (d) a reducer to enable the rubber tube to be connected to the outlet of the mechanical trap.

6.1.2 Test Procedure

The one-way sealing performance test shall be conducted as follows:

- (a) Prime the mechanical trap by running 3.8 L (1 gal) of water through it.
- (b) Connect the rubber tube through the reducer to the outlet of the mechanical trap.

- (c) Connect the other end of the rubber tube to the tee-junction.
- (d) Connect another leg of the tee-junction to the U-tube manometer and the remaining leg of the tee-junction to another piece of rubber tube.
- (e) Apply air pressure to the free end of the rubber tube until the U-tube manometer reads 50 mm (2 in).
- (f) Clamp the end of the tube and maintain the air pressure for 10 s.

6.1.3 Performance Requirements

The mechanical trap shall retain a seal under a backpressure.

6.2 Hydrostatic Pressure (Leak Tightness) Test

6.2.1 Test Procedure

The hydrostatic pressure (leak tightness) test shall be conducted as follows:

- (a) Install the mechanical trap in its intended position.
- (b) Subject the mechanical trap to a hydrostatic pressure of 172 kPa (25 psi).
- (c) Maintain the hydrostatic pressure for 1 h.

6.2.2 Performance Requirements

There shall be no leakage and the mechanical trap shall maintain air tightness.

6.3 Chemical Resistance Test

The chemical resistance test shall be conducted as follows:

- (a) Install the mechanical trap in its intended position in a urinal.
- (b) Pour 350 mL (12 oz) of liquid drain cleaner containing sulfuric acid into the mechanical trap.
- (c) Maintain the liquid drain cleaner for 1 min.
- (d) Pour 2 L (0.55 gal) of water at ambient temperature to flush the liquid drain cleaner.
- (e) Let the mechanical trap and urinal assembly sit for 24 h.
- (f) Conduct the one-way sealing performance test specified in Section 6.1.

6.4 Life Cycle Test

The life cycle test shall be conducted as follows:

- (a) Install the mechanical trap in its intended position in a urinal.
- (b) Flow 500 mL (17 oz) of water through the mechanical trap over a period of 10 s.
- (c) Wait 10 s.
- (d) Repeat Steps (b) and (c) 20,000 times.
- (e) Conduct the one-way sealing performance test specified in Section 6.1.

7 Requirements for Non-Water-Consuming Urinals

7.1 Resistance-to-Stoppage Test

7.1.1 Test Procedure

The resistance-to-stoppage test shall be conducted on non-water-consuming urinals only, as follows:

- (a) Install the test specimen in accordance with the manufacturer's instructions.
- (b) Place two uncrumpled, unfiltered cigarette pieces, approximately 38 ± 5 mm (1.5 ± 0.2 in) long, in the test specimen.
Note: *Cigarette pieces are created by folding in half an unfiltered cigarette upon itself until the paper tears.*
- (c) Add 1 L (0.26 gal) of water to the test specimen at a flow rate of 0.5 L/min (0.13 gpm).
- (d) Continue to add cigarette butts and water in alternation until 20 cigarette pieces and 10 L (2.64 gal) of water have been added to the test specimen.
- (e) Remove the cigarette pieces from the test specimen.
- (f) Repeat the test procedure specified in Steps (b) to (e) five times, alternating between crumpled, unfiltered cigarette pieces and un-crumpled, unfiltered cigarette pieces, so that a

total of three test runs are conducted with un-crumpled butts and a total of three test runs are conducted with crumpled butts, for a total of six test runs.

7.1.2 Performance Requirements

There shall be no evidence of stoppage or clogging of the test specimen during each test run or after the cigarette pieces are removed.

7.2 Tightness-of-Removable-Trap Test

7.2.1 Test Procedure

The tightness-of-removable-trap test shall be conducted on non-water-consuming urinals only, as follows:

- (a) Install and remove the trap insert of the test specimen 50 times using the extractor tool provided by the manufacturer.
- (b) Perform an air pressure test on the test specimen trapway by applying a pressure of 10 kPa (1.45 psi) for 15 min.
- (c) Repeat the procedure specified in Step (b) four times for a total of five test runs.

7.2.2 Performance Requirements

There shall be no pressure loss at any time during the test.

7.3 Ammonia-Detection Test

7.3.1 Test Enclosure

The test specimen shall be installed, in accordance with the manufacturer's installation instructions and in compliance with the local code requirements, in an enclosed area dedicated exclusively for this test. The test enclosure shall

- (a) have an area of approximately 2 m² (22 ft²) or the size of two telephone booths;
- (b) isolate the test specimen and prevent air motions that might affect the accuracy of the readings; and
- (c) have a single entry and exit door.

7.3.2 Temperature Control

7.3.2.1 The test enclosure shall have a suitable temperature-control system to maintain an air temperature between 20 and 38 °C (68 and 100°F) in the test area throughout the test period.

7.3.2.2 Test-enclosure temperatures shall be recorded using a device installed 300 mm (12 in) above and 50 mm (2 in) to the right of the test specimen. The temperature-recording device shall

- (a) be capable of recording maximum, minimum, and current temperatures;
- (b) have an accuracy of at least ±1 °C (±2°F); and
- (c) have a minimum display resolution of 0.1 °C (0.1°F).

7.3.3 Drainage

Liquids from the test specimen may be collected in a vessel or discharged into the test facility drainage system.

7.3.4 Ammonia Measurement Equipment

Ammonia shall be measured using a Dräger-Tube accuro® bellows pump and Dräger Short-term Tubes®, or equivalent equipment, capable of measuring 2 to 30 ppm of ammonia.

7.3.5 Test Specimen Cleaning During Testing

During the test period, the test specimen shall be cleaned before testing and at the end of each day, in accordance with the manufacturer's maintenance instructions (i.e., the cleaning products and the quantities used shall be those specified by the manufacturer for regular cleaning). The cleaning products shall be selected randomly from consumer-sized packages supplied by the manufacturer and concentration of ammonia in each cleaning product shall be recorded.

7.3.6 Test Data

The following data shall be recorded during the test period:

- (a) Maximum, minimum, and current temperatures.
- (b) Time when the test specimen was cleaned.
- (c) Time when the test specimen was tested for detection of ammonia.
- (d) Ammonia content in the sampled air.
- (e) The horizontal distance between the wall where the test specimen is mounted and the point on the test specimen farthest away from the wall (urinal lip).
- (f) The functioning of the test specimen.

7.3.7 Test Solution

The test solution shall be a 3% solution of commercially available unscented ammonia in water.

7.3.8 Test Procedure

7.3.8.1 Sampling Locations

Ammonia shall be measured using the equipment specified in Section 7.3.4 at each of the following locations:

- (a) Lip: 75 ± 13 mm (3.0 ± 0.5 in) directly above the farthest projection of the urinal lip;
- (b) Well: 75 ± 13 mm (3.0 ± 0.5 in) directly above the lowest point in the urinal well;
- (c) Adult standing: $1,500 \pm 40$ mm (59.0 ± 1.5 in) above the floor, directly above the farthest projection of the urinal lip (see Section 7.3.6(f)); and
- (d) Adult seated: $1,200 \pm 40$ mm (47.0 ± 1.5 in) above the floor, directly above the farthest projection of the urinal lip (see Section 7.3.6(f)).

7.3.8.2 Test Equipment Validation

The test equipment shall be validated as follows:

- (a) Pour the test solution into a 120 mL (4 oz) uncovered container.
- (b) Place the container in or adjacent to the test specimen well.
- (c) Take ammonia measurements as specified in Section 7.3.8.1.
- (d) Record all measured parameters.

7.3.8.3 Ammonia Detection Test

The ammonia detection test shall be conducted as follows:

- (a) Pour the test solution into the test specimen well at a rate of 950 mL (32 oz) $\pm 10\%$ for 30 ± 5 s, for a total of 475 mL (16 oz).
- (b) Observe and record if any test solution remains in the well.

- (c) Repeat Steps (a) and (b) two times at 4 min intervals, for a total of three pours.
- (d) Take ammonia measurements 5 min, 15 min, 30 min, and 60 min after completion of Step (c) at the locations specified in Section 7.3.8.1.
- (e) Record the results.
- (f) Repeat Step (a) to (e) three times a day for three consecutive days, at approximately the same times each day.

7.3.8.4 Performance Requirements

No test solution shall remain in the test specimen in eight of nine test runs. In addition, ammonia

- (a) measurements taken in accordance with Section 7.3.8.3 shall not exceed 40% of the measurements taken in accordance with Section 7.3.8.2; and
- (b) concentration measurements in 95% or more of the air samples taken over the course of the test period shall not exceed 10 ppm.

8 Markings, Packaging, and Accompanying Literature

Urinals complying with this Standard shall comply with the applicable requirements for markings, packaging, and installation instructions and other literature specified in ASME A112.19.2/CSA B45.1.