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Ceramic Sanitary Appliances - Urinals

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Foreword

Saudi Standards, Metrology and Quality Organization (SASO) has prepared the Saudi Standard “**Ceramic Sanitary Appliances - Urinals**” based on relevant Standards and references.

Draft for Study

Ceramic Sanitary Appliances - Urinals

1. Scope and Field of Application

This standard specifies requirements for materials, quality, performance, functional and connecting dimensions for vitreous china urinals and stainless still.

2. Complementary References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, that latest edition of the referenced document (including any amendments) applies.

2.1 SASO 1025, "Ceramic Sanitary Appliances - General Requirements".

2.2 SASO 1477, "Sanitary Appliances - Pressurized Flushing Devices".

2.3 SASO 3034, "Ceramic Sanitary Appliances - Waterless Urinals".

3. definitions and abbreviations

3.1 Definitions

The following definitions shall apply in this Standard:

3.1.1 Urinal

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

3.1.2 Non-water-consuming urinal

A urinal that conveys liquid body waste through a trap seal into a gravity drainage system without the use of water.

4. Requirements

Urinals shall meet the following requirements:

4.1 Dimensions and Tolerances

4.1.1 Thickness

The ceramic material in plumbing fixtures shall be at least 6 mm thick throughout (exclusive of glaze).

4.1.2 Tolerances

Unless otherwise specified in this Standard, the tolerance on dimensions of 200 mm and greater shall be $\pm 3\%$. The tolerance on dimensions less than 200 mm shall

be $\pm 5\%$.

In this Standard, dimensions specified as “minimum” or “maximum” shall not be reduced below the specified minimum or increased above the specified maximum by application of a tolerance. If a dimensional range is specified and the word “minimum” or “maximum” does not appear, the upper and lower limits shall not be considered critical and the appropriate tolerance shall apply.

4.2 Material and quality

Urinal manufactured from vitreous china comply with the Saudi standard mentioned in Clause 2.1.

4.3 Integral trap diameter

Integral traps on urinals shall have a diameter that will allow a solid ball with the applicable minimum diameter specified in Table 3 to pass.

4.4 Spuds

For urinals operated by flushometer valves, the standard nominal spud size shall be 1/2, 3/4, 1-1/4, or 1-1/2. Other spud dimensions shall be as specified in Saudi standard mentioned in Clause 2.2

4.5 Non-water-consuming urinals

In addition to complying with the applicable requirements of this Standard, non-water-consuming urinals shall comply with the Saudi standard mentioned in Clause 2.3.

5. Flushing Devices Used With Fixtures

5.1 General

5.1.1 Flushing devices shall deliver water at a sufficient rate and quantity to permit urinals to comply with the hydraulic performance requirements of this Standard. Gravity flush tanks, pressurized flushing devices, and other flushing methods may be used.

5.1.2 Air gaps, vacuum breakers, or other backflow preventers shall be installed above the overflow or flood level of the fixture. Alternatively, spill openings to the outside of the flush tank shall be provided as required by Clause 5.2.4 or 5.3.2.

5.2 Pressurized Flushing Devices

5.2.1 General

Pressurized flushing devices shall comply with the Saudi standard mentioned in 2.4. The critical level of the lowest anti-siphon device in a flushometer-valve-activated water closet shall be at least 25 mm above the flood level of the water closet bowl rim.

5.2.2 Low-profile tanks with pressurized flushing devices

When the critical level of the pressurized flushing device in low-profile tank

Urinals is below the flood level of the bowl rim, an auxiliary spill opening(s) shall be provided to ensure that the water in the tank will drain to the floor if the overflow is clogged or the trap is blocked. The size and position of these openings shall be such that with the pressurized flushing device at the full open position and the water pressure at maximum, no water shall rise to the critical level of the pressurized flushing device.

5.2.3 Electrical supply cords

Electrical supply cords shall

- (a) be between 0.9 and 1.8 m long;
- (b) be permanently attached; and
- (c) have an attachment plug for connection to the branch-circuit supply.

6. Wall-mounted Urinal Structural Integrity

A vertical load of 0.22 KN shall be applied on the top surface on the front of the urinal rim.

7. Urinals Performance Test

7.1 General

7.1.1 The test methods and performance requirements specified in Clauses 8.2 to 8.6 shall apply to water-consuming urinals. The test methods and performance requirements specified in Clause 8.7 shall apply only to non-water-consuming urinals.

7.1.2 Urinals shall be tested at the test pressures specified in Table 2 or at the manufacturer's recommended minimum pressure. However, a test pressure greater than 550 kPa (80 psi) shall not be used.

7.1.3 Test results shall be evaluated and reported in accordance with the procedures specified for each test.

Suggested formats for reporting test results are shown in Figures A.1 and A.2. Alternative formats for accurately reporting data shall also be acceptable.

7.2 Test Apparatus And General Instructions

7.2.1 The procedure for standardizing the water supply system for testing flushometer valve urinals shall be as follows:

- (a) Set the static pressure at gauge 7 by adjusting pressure regulator 4 to 170 kPa (25 psi).
- (b) Attach the flushometer valve, with matching supply stop in the fully open position, at the discharge end of the water supply system and leave the flushometer valve discharge outlet open to the atmosphere.
- (c) Activate the flushometer valve and establish a peak flow rate, by adjusting valve

8, of 38 ± 2 L/min (10 ± 0.5 gpm). If the flushometer valve specified by the manufacturer is not capable of attaining the minimum flow rate, adjust the flushometer to its fully open position.

- (d) Connect the flushometer valve to the test urinal.
- (e) Record the peak flowing pressure at gauge 10 and the peak flow rate through the flushometer valve while it is attached to the urinal. While conducting water consumption testing at 350 and 550 kPa (50 and 80 psi), maintain the peak flow rate at ± 4 L/min (± 1 gpm) by adjusting valve 9 as necessary.

The temperature of the water shall be 18 to 27 °C (65 to 80°F).

- 7.2.2 The urinal shall be plumb, the trap and outlet shall be clear, and, if applicable, the urinal shall be filled to the weir level before each test run. The urinal shall discharge to atmosphere.
- 7.2.3 At the applicable test pressure(s) specified in Table 6, the supply stop shall be adjusted in accordance with the manufacturer's instructions and specifications. In the absence of such instructions and specifications, the stop shall be adjusted as specified in Clause 7.2.1(b).
- 7.2.4 The flushing device shall be activated in a normal manner.
- 7.2.5 The results shall be evaluated and reported in accordance with the applicable procedures specified in

7.3 Trap seal depth determination test

Note: See Figure 13. Although Figure 13 depicts a water closet, it is also applicable to urinals.

7.3.1 Apparatus

Figure 13 shows an acceptable apparatus for determining trap seal depth. Another apparatus, e.g., a steel tape measure or a steel rule with a perpendicular horizontal element secured to one end, may also be used.

7.3.2 Procedure

The trap seal depth determination test shall be conducted as follows:

- (a) Lower the probe until the horizontal element is resting against the trap dip.
- (b) Record the corresponding scale value as h1.
- (c) Disengage the horizontal element from the probe.
- (d) Elevate the probe completely out of the water.
- (e) Confirm that the urinal is at full trap seal depth by slowly pouring water into the well until a slight overflow is detected dripping from the urinal outlet.
- (f) When the dripping ceases, adjust the probe so that its point is exactly at the water surface.
- (g) Record the corresponding scale value as h2.
- (h) Calculate the full trap seal depth, Hf, by subtracting h1 from h2 ($H_f = h_2 - h_1$).

7.3.3 Report

The full trap seal depth, H_f , shall be reported.

7.3.4 Performance

The full trap seal depth, H_f , shall be at least 51 mm (2.0 in).

7.4 Surface wash test

7.4.1 Test medium

The test medium shall be an ink line applied using a wet-erase fine-point transparency marker. The color of the ink shall contrast with that of the urinal.

7.4.2 Procedure

The surface wash test shall be conducted as follows:

- (a) Scrub the flushing surface of the urinal clean with a mild liquid dishwashing detergent.
- (b) Rinse and dry the flushing surface.
- (c) On the back wall of the urinal, draw a continuous horizontal ink line at one-third the distance measured from below the lowest point of the flushing rim to the top of the water surface. This line shall extend to 50% of the distance along the interior sidewall. Where the interior sidewall is not spreader down to defined by a reverse draft molding, a reference line shall be drawn from the front of the top rear of the urinal lip to the point where it merges with the shield.
- (d) Activate the flushing device.
- (e) When the trap refill cycle is complete, measure and record the length of any ink line segments remaining on the flushing surface.

Items (a) to (e) complete one test run. These steps shall be repeated until three sets of data are obtained.

7.4.3 Report

The lengths and locations of any ink line segments remaining on the flushing surface after each flush shall be reported in a format similar to that of Figure A.1.

7.4.4 Performance

The total length of the ink line segments remaining on the flushing surface after each flush shall not exceed 25 mm (1.0 in) when averaged over three test runs. No individual segment shall be longer than 13 mm (0.5 in).

7.5 Dye test

7.5.1 Test medium and apparatus

The dye test medium shall be 5 g of methylene blue powder or brilliant polar blue dye. A thoroughly clean container to mix 1 L of dye and a clean container to mix the control sample shall be used.

7.5.2 Procedure

The dye test shall be conducted as follows:

- (a) Add 5 g of the powder or dye to 1 L of water and mix the solution thoroughly.
 - (b) Clean the test urinal, flush it once, and allow it to complete its flush cycle.
 - (c) Add 30 mL of the dye solution to the water in the urinal well and mix it thoroughly.
 - (d) Remove 10 mL of this solution from the urinal and add it to 1000 mL of clean water in a clean container (i.e., use a dilution ratio of 100:1). Set aside a sample of this solution in a test tube or comparator vial as the control sample for all three test runs.
 - (e) Flush the urinal and clean it to ensure that all traces of the dye have been removed.
 - (f) Add 30 mL of the dye solution to the urinal and mix the solution.
 - (g) Activate the flushing device and allow the urinal to complete its flush cycle.
 - (h) Fill a test tube or comparator vial with the diluted solution from the urinal and compare it against the control sample.
 - (i) Record the darkness of color of the test sample relative to the control sample.
- Items (e) to (i) complete one test run. These steps shall be repeated until three sets of data are obtained.

7.5.3 Report

The color of the test solution sample shall be compared to the color of the control solution sample. The test report shall indicate whether the test sample is lighter than, darker than, or the same color as the control sample.

7.5.4 Performance

The color of the test sample shall be lighter than or equal to that of the control sample.

7.6 Water consumption test

7.6.1 Apparatus

A receiving vessel, calibrated by volume in increments not exceeding 0.25 L or placed on a load cell with a readout in increments not exceeding 0.25 L, or any other apparatus capable of measuring volumes to within 0.25 L (0.07 gal), shall be used.

7.6.2 Procedure

The water consumption test shall be conducted as follows:

- (a) Record the static pressure (see Table 2).
- (b) Activate the flushing device.

- (c) Record the volume received in the vessel (main flush volume) when the main flush is completed, i.e., when the trailing flow that occurs at the end of the main discharge ceases.
- (d) Record the total flush volume after cessation of flow of the excess trap seal restoration (after flow) after the first observation.
- (e) Round down the total flush volume to the nearest 0.25 L.
- (f) The amount of excess trap refill (after flow) shall be determined by subtracting the main flush volume from the total flush volume.

Items (a) to (f) complete one test run. These steps shall be repeated until three sets of data are obtained for both test pressures specified in Table 2.

7.6.3 Report

Static pressure, main and total flush volume, and after flow (if any) shall be reported in a format similar to that of Figure A.2. The report shall also indicate whether the trap seal was restored.

7.6.4 Performance

The average water consumption of urinals over the two pressures specified in Table 2 shall not exceed 1.9 Lpf. This requirement shall be based on the average of the individual values from the three test sets.

7.7 Tests for non-water-consuming urinals

Non-water-consuming urinals shall be tested in accordance with Saudi standard mentioned in Clause 2.3

8. Markings, packaging, and installation instructions and other literature

8.1 General

8.1.1 Ceramic plumbing fixtures shall be marked with the manufacturer's name or registered trademark or, in the case of private labelling, the name of the customer for whom the fixture was manufactured. Additional markings shall be in accordance with Clauses 8.2 to 8.5, as applicable.

8.1.2 Markings shall be permanent, legible, and visible after installation.

8.1.3 Acceptable means of applying permanent markings shall include firing on, etching, sand blasting, stamping with a permanent (non-water-soluble) ink, and casting in.

8.2 Non-standard fixtures

8.2.1 Fixtures that require proprietary (i.e., non-standard) components, e.g., supply fittings, waste fittings, or water closet seats, shall indicate, in the packaging or the accompanying literature, that such components are provided by the manufacturer and shall identify the proper replacement parts.

- 8.2.2 Fixtures that do not comply with one or more of the dimensional requirements of this Standard shall be marked with an “N” to indicate the non-standard nature of the fixture.

Note: This Clause is not intended to apply to fixtures that comply with none of the dimensional requirements of this Standard.

8.3 Additional markings for urinals

8.3.1 Water consumption

Urinals shall be marked to identify their average water consumption, expressed in liters per flush, as follows:

- (a) 1.9 Lpf or the actual tested water consumption.

8.4 Packaging

- (a) Packaging for ceramic plumbing fixtures shall be marked with the manufacturer’s name or registered trademark or, in the case of private labelling, the name of the customer for whom the fixture was manufactured; and
- (b) model number.

Packaging for urinals shall be marked with the average water consumption in accordance with Clause 8.3.2.

8.5 Installation instructions and other literature

If the manufacturer’s recommended minimum pressure is greater than the applicable value specified in Table 2, the manufacturer’s packaging and installation instructions and other literature shall be marked with the recommended minimum pressure.

- 8.5.1 The number of this Saudi standard.

- 8.5.2 The country of origin.

Table1
Minimum dimensions for urinals, mm (in)
 (See [Clause 4.4.](#))

Type of urinal	<i>A</i>	<i>B</i>	<i>C</i>		<i>D</i>	
	Interior width	Interior height	Interior depth		Projection	
			Without shields	With shields	Regular	Extended lip
Wall mounted	216 (8.5)	191 (7.5)	76 (3.0)	178 (7.0)	152 (6.0)	203 (8.0)
Stall	305 (12.0)	813 (32.0)	76 (3.0)	178 (7.0)	152 (6.0)	203 (8.0)

Note: Interior width and interior depth shall be measured halfway between the top and bottom of the interior opening.

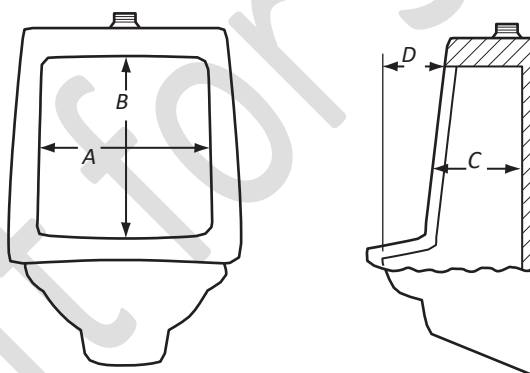


Table 2
Static test pressures for urinals, kPa (psi)
 (See [Clauses 7.1.2, 7.2.3, 7.6.2, 7.6.4, and 8.6...](#))

Clause	Test	Pressure
7.4	Surface wash	175 (25)
7.5	Dye	175 (25)
7.6	Water consumption	175 (25) and 550 (80)

Table 3
Integral trap diameter requirements for urinals, mm
 (See [Clause 4.3](#))

Type of urinal	Minimum	Minimum diameter of ball (mm)
Stall		—
Blowout		19
Siphon Jet		23
Washout		23

Annex A (informative)

Suggested formats for reporting test results

Note: This Annex is not a mandatory part of this Standard.

Run no.	Number of ink line segments remaining on the flushing surface	Length of each segment, mm (in)	Combined length of segments, mm (in)
1			
2			
3			
Average combined length, mm (in)			

Figure A.1
Suggested format for reporting results of the surface wash test for urinals

Static pressure, kPa (psi)	Run no.	Flush volume, L (gal)			Trap seal restored? (yes/no)
		Main flush	Total flush	Afterflow (total flush minus main flush)	
	1				
	2				
	3				
	Average total flush volume, L (gal)				
	1				
	2				
	3				
	Average total flush volume, L (gal)				

Figure A.2
Suggested format for reporting results of the water consumption test for urinals
(See Clauses 7.1.3 and 7.6.3.)

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