ASME A112.19.9M–1991

REAFFIRMED 1998

FOR CURRENT COMMITTEE PERSONNEL
PLEASE SEE ASME MANUAL AS-11

Non-Vitreous Ceramic Plumbing Fixtures

AN AMERICAN NATIONAL STANDARD

The American Society of
Mechanical Engineers

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Supplement 1-2002

to

ASME A112.19.9M-1991
Non-Vitreous Ceramic Plumbing Fixtures

(This Supplement was approved as an American National Standard on July 3, 2002.)

Paragraphs 4.7 and 7.5 have been revised. The revised paragraphs appear below.

4.7 Lavatories

When provided, lavatory overflow shall have either a minimum cross-sectional area not less than $1\frac{1}{8}$ in.^{2} (725 mm^2) at every point in the passageway or shall have a minimum flo capacity as specifie in ASME A112.18.1 for lavatory faucet when tested in accordance with para. 7.5. The location of the overflo shall be optional. The overflo point floo level of the slab shall be no more than $\frac{1}{2}$ in. (13 mm) above the slab surface at the lowest point of the faucet bearings.

7.5 Lavatory Overflow Test

The lavatory shall be installed with a standard mechanical waste fittin and the lavatory leveled in the stand. The waste outlet shall be closed and the water supply adjusted to supply water to the fixtur at a rate as specifie in ASME A112.18.1 for lavatory faucet. The elapsed time from the onset of water flowin into the overflo opening until the water begins to overflo the floo level shall be measured. The fixtur shall drain for a minimum of 5 min from the onset of water flowin into the overflo opening, without overflowin the floo level.

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ERRATUM
TO
ASME A112.19.9M-1991
NON-VITREOUS CERAMIC PLUMBING FIXTURES

On page 18, in Fig. 17, the second callout from the top, 14 in. min, is corrected to read 4 in. min. The revised figure appears below.

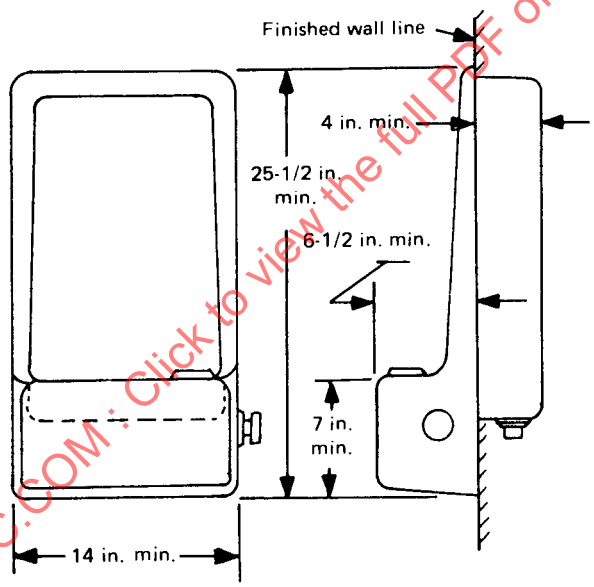

FIG. 17 DRINKING FOUNTAIN, SEMI-RECESSED [Para. 5.5.2 (b)]

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
Three Park Avenue, New York, NY 10016-5990

May 1999

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AN AMERICAN NATIONAL STANDARD

Non-Vitreous Ceramic Plumbing Fixtures

ASME A112.19.9M–1991

The American Society of Mechanical Engineers

345 East 47th Street, New York, N.Y. 10017

Date of Issuance: August 30, 1991

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 A112.19.9M-1991.)

In the early days of plumbing fixture production, many plumbing fixtures were produced of a material called earthenware. This glazed ceramic was the staple product for all plumbing products for decades until production ceased with the increasing demand for vitreous china materials. Vitreous materials were determined to be superior in resistance to water absorption, which is a most desirable characteristic of a sanitary plumbing component. With the increasing demand for large sinks and lavatories, non-vitreous ceramic regained industry consideration due to its trait of reduced warpage. The ASME A112 Panel 19 Working Group 9 began their work on this Standard in 1988.

It should be noted that the scope of this Standard limits the production on non-vitreous ceramic products to fixtures which do not normally retain water on a continuous basis and which can be thoroughly glazed. Examples of such products are lavatories, bidets, sinks, and water closet tanks.

This Standard has been approved by the American Society of Mechanical Engineers Committee A112, Standardization of Plumbing Materials and Equipment, Panel 19 on Plumbing Fixtures. On March 19, 1991, the American National Standards Institute adopted this proposal as an American National Standard, and designated it as A112.19.9M-1991.

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Standardization of Plumbing Materials and Equipment

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NON-VITREOUS CERAMIC PLUMBING FIXTURES

1 SCOPE AND PURPOSE

1.1 Purpose

The purpose of this Standard is to establish a nationally recognized standard for plumbing fixtures of non-vitreous ceramic, including fixtures containing components of other recognized materials, for the guidance of manufacturers, distributors, and purchasers to promote better understanding between suppliers and users; and to furnish a basis for fair competition in furnishing such plumbing fixtures to meet the principal demands of the trade.

1.2 Scope

This Standard covers physical requirements and test methods pertaining to material, grading, dimensions, certain features of construction, and types and sizes of plumbing fixtures of non-vitreous ceramic currently in general use and demand. Also given are definitions, inspection methods, and tests which establish generally acceptable quality standards. Fixtures included in this Standard are water closet tanks, lavatories, urinals without integral trap, bidets, bathtubs, shower receptors, kitchen and bar sinks, service sinks, and drinking fountains. The values stated in U.S. Customary units are to be regarded as the standard.

2 REFERENCED STANDARDS

The following standards are referenced in this document. When the revisions to these standards are prepared, the updated edition shall apply.

ASME/ANSI A112.1.2-1979, Air Gaps in Plumbing Systems

ASME/ANSI A112.6.1-1988, Supports for Off-the-Floor Plumbing Fixtures for Public Use

ASME/ANSI A112.18.1M-1989, Plumbing Fixture Fittings

ASME/ANSI A112.19.5-1979, Trim for Water Closet Bowls, Tanks, and Urinals

ASME/ANSI A112.19.6M-1990, Hydraulic Performance for Water Closets and Urinals

ANSI A117.1-1986, Standard Specification for Making Buildings and Facilities Accessible and Usable by Physically Handicapped People

ANSI/ARI 1010-1984, Drinking Fountains and Self-Contained, Mechanically Refrigerated Drinking Water Coolers

ANSI/ASSE 1001-1982, Pipe Applied Vacuum Breakers

ANSI/ASSE 1002-1986, Water Closet Flush Tank Fill Valves (Ballcocks)

ASSE 1037-1986, Performance Standard for Pressurized Plumbing Fixture Flushing Devices (Flushometers)

IAMPO PS4-83, Shower Drains

3 NOMENCLATURE AND DEFINITIONS

Nomenclature and definitions applicable to non-vitreous ceramic plumbing fixtures are as follows:

bidet — a personal hygiene fixture with hot and cold water supply intended for genital and perineal cleanliness

blister — a raised portion of the surface not greater than $^1/_8$ in. (3 mm) in maximum dimension

blister (large) — a raised portion of the surface greater than $^1/_8$ in. (3 mm) in maximum dimension

bubble — a raised portion of the surface or a sand speck smaller than $^1/_{32}$ in. (1 mm) in maximum dimension

craze — fine cracks in the glaze

discoloration — a colored spot over $^1/_4$ in. (6 mm) in maximum dimension or a sufficient number of specks or spots to give the effect of a change in color

dull or eggshell finish — dead or flat finish, undeveloped glaze, or a semi-glazed finish with numerous very fine pinholes, or slightly matted in appearance, not glossy; not to be confused with a satin or matte finish used for decorative purposes

dunt — a hairline fracture extending through the body and caused by strains set up in the process of manufacture

earthenware — one type of non-vitreous ceramic (see para. 4.1.1)

exposed body — unglazed portion $^1/_{16}$ in. (2 mm) or more in maximum dimension

finish — texture and condition of surface other than color

fire check — fine shallow crack in the body not covered with glaze (when sufficiently covered with glaze so as to be easily cleaned, it is not detrimental)

fireclay — non-vitreous ceramic materials which include in its composition, pre-fired clays (called grog) which are ground into small grains and are added to the slip. (See para. 4.1.1 for further delineation of fireclays.)

first quality — first class ware in conformance with the grade limitations and other requirements of this Standard. May also be called "A" grade ware.

fittings — adjuncts to a fixture subject to selection or options of the purchaser as, for example, faucets and waste plugs

fixture — the ware only, without trim and/or fittings

flush tank — a container for a measured quantity of water, fitted with an inlet valve (ballcock) and a flush valve, either wall hung or close coupled (with closet bowl), used to flush a water closet bowl by gravity force

flush valve — a special form of valve located at the bottom of a flush tank used in flushing a water closet or urinal

flushing surface — the surface, visible after installation, which may be wetted during the operation of the fixture

flushometer tank — a valve whose function is defined in *flushometer valve* below, but integrated within an accumulator vessel affixed and adjacent to the fixture inlet so as to cause an effective enlargement of the supply line immediately before the flushometer valve

flushometer valve — a valve attached to a pressurized water supply pipe and so designed that when actuated, it opens the line for direct flow into the fixture at a rate and quantity to properly operate the fixture, and then gradually closes to provide trap reseal in the fixture in order to avoid water hammer. The pipe to which this device is connected is, in itself, of sufficient size, that when open, will allow the device to deliver water at a sufficient rate of flow for flushing purposes.

integral — a part cast integrally with the fixture such as a bubbler, trap, or seat

non-vitreous ceramic — for the purpose of this Standard, compound ceramic materials fired at high temperature, coated with ceramic glaze fused to the body, which does not peel or craze. Non-vitreous ceramic materials are classified as semi-vitreous, fireclay, or earthenware based on grain size and percentage of absorption (see paras. 4.1.1 and 7.1).

permanent — for the purpose of marking in this Standard, permanent shall be fired, cast, sandblasted, embossed, stamped, etched, or otherwise not removable except by excessive work or extraordinary means (see Section 8)

pinhole — a small hole in the glazed surface up to and including $^1/_{16}$ in. (2 mm) in maximum dimension

pit — a hole in the glazed surface larger than $^1/_{16}$ in. (2 mm) in diameter

polishing mark — a spot not larger than $^3/_8$ in. (10 mm) in maximum dimension where some minor blemish has been removed by polishing

pottery square — a square 2 in. (50 mm) on each side. For grading purposes, it may be a 2 in. (50 mm) square hole cut in a small sheet of any flexible material, such as rubber or paper, for convenience in sliding over irregular surfaces to determine segregation

pressurized flushing devices — a product which uses the water supply to create a pressurized discharge to flush the fixture exclusive of gravity type flushing systems. Flushometer valves and flushometer tanks are examples of pressurized flushing devices. This term may be called a pressurized flushing device in this Standard (see ASSE 1037).

projection — a raised portion of the surface over $^1/_4$ in. (6 mm) in maximum dimension

rim — the unobstructed open edge of a fixture

roughing-in measurement — dimension from finished wall or floor-to-center of waste or supply opening or mounting holes

sanitary — readily kept in cleanliness and free from visible stains

seconds — ware that grades below "first quality" but that is considered seviceable and safe from a health

or sanitary point of view. May also be called "B" grade ware.

segregation — more than four spots, blisters, or pinholes in any pottery square

semi-vitreous — one type of non-vitreous ceramic (see para. 4.1.1)

speck — an area of contrasting color less than $^1/_{32}$ in. (1 mm) in maximum dimension. Specks less than $^1/_{100}$ in. (0.3 mm) in maximum dimension, unless in sufficient number to form a discoloration, are not counted

spot — an area of contrasting color $^1/_{32}$ in. (1 mm) up to and including $^1/_8$ in. (3 mm) in maximum dimension

spot (large) — an area of contrasting color greater than $^1/_8$ in. (3 mm) in maximum dimension

spud — a threaded assembly inserted in the vitreous chinaware

trap — a fitting or device so designed and constructed as to provide, when properly vented, a liquid seal which will prevent the backpassage of sewer gas without materially affecting the flow of sewage or wastewater through it

trim — parts other than china regularly supplied with a fixture, as for example, closet spuds, wall hangers, and tank trim. Trim does not include fittings (see ANSI A112.19.5M).

urinal — a plumbing fixture which receives 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

wavy finish — a defect in the finish having the appearance of numerous runs in the glaze, irregular or mottled

4 GENERAL REQUIREMENTS

4.1 Materials

4.1.1 Classification. Three types of non-vitreous ceramic materials as defined below may be used for use in plumbing fixtures.

Material	Absorption, %	Grog Regrind Particle Size, mm
Semi-vitreous	0.6 to 0.8	—
Coarse fireclay	8.0 to 15.0	1.0 to 1.5
Fine fireclay	8.0 to 15.0	0.1 to 0.2

Each of these materials shall be deemed acceptable if the glazing thoroughly fuses to the base material to provide a waterproof barrier between the wetted area and the base material as tested in accordance with this Standard.

4.1.2 Crazing. Recognizing the inherent porosity of these materials, non-vitreous ceramics shall meet the crazing tests in para. 7.1.

4.1.3 Alternate Materials. When alternate materials are used as components within a non-vitreous ceramic assembly, the materials shall conform to applicable material standards for the plumbing application. They shall satisfy this Standard regarding quality, strength, effectiveness, durability, and safety. They shall also be repairable or replaceable within the non-vitreous ceramic product.

4.2 Thickness

Non-vitreous ceramic shall not be less than $^1/_4$ in. (6 mm) thick at any point and shall meet the performance requirements of para. 7.3.

4.3 Joints

All joints between dissimilar materials within a fixture shall conform with this Standard.

4.4 Glazed Surfaces

The glaze shall be thoroughly fused to the fixture body. Any surface continuously subjected to standing water shall be completely glazed. All exposed surfaces shall be glazed, except those coming into contact with walls or floors, and except as follows:

(a) on lavatories set away from walls:

(1) those portions of rear aprons which support the fixture in kilns;

(2) on backs of overflows and undersides of outlet bosses.

(b) backs and undersides of water closet tanks

(c) undersides and backs of covers

(d) undersides of drop-in lavatories

(e) back sides of lavatory legs or pedestals.

Other fixtures may have unglazed portions at points where supported in the kilns, but such unglazed surfaces shall be located so as not to be visible when the fixture is installed in the normal manner. A matte or satin finish shall be acceptable, if it is part of the decorative treatment.

4.4.1 Color. Non-vitreous ceramic plumbing fixtures may be made in white and in colors. The shade or tint of each color is determined by the individual manufacturer. It is recognized that differences in manufacturing conditions, base materials, and lighting produce minor variations in color which are commercially acceptable and shall not be cause for rejection.

4.5 Grading

Non-vitreous ceramic plumbing fixtures shall be graded and marked in accordance with the methods given herein (see Sections 6 and 8). The terms "first quality" and "seconds" shall be used to designate the grades thus determined. First quality fixtures shall be in full conformity with this Standard and shall be free from blemishes and defects to the extent specified in Tables 1, 2, or 3, as applicable.

4.6 Dimensions and Tolerances

Fixtures shall conform to the applicable dimensions and tolerances given herein. Where not otherwise indicated, a tolerance of ±5% shall apply. Maximum and minimum dimensions shall not be subject to a tolerance beyond the limits given.

4.7 Lavatories

When provided, lavatory overflows shall have either a minimum cross-sectional area not less than $1^1/_8$ sq. in. at every point in the passageway or shall have a minimum flow capacity of 3.0 gpm when tested in accordance with para. 7.5. The location of the overflow shall be optional. The flood point of the slab shall be not more than $^1/_2$ in. (13 mm) above the slab surface at the lowest point of the faucet bearings.

4.8 Flushing Devices

A flushing device is any product designed to cause the delivery of a desired quantity of water at a prescribed flow rate and volume into a water closet or urinal in order to create a proper flushing action in accordance with ASME/ANSI A112.19.6M.

Gravity tanks and pressurized flushing devices shall be permitted, provided such devices insure proper backflow protection in accordance with industry standards.

Air gaps, vacuum breakers, other backflow preventers, and vacuum breakers shall be installed above the spill line of the fixture or device, or positive spill openings to the outside of the flush tank shall be provided since the tank overflow could become blocked, fouled, or otherwise stopped.

4.8.1 Gravity Flush Tanks. Trimmed gravity-type tanks shall include an anti-siphon fill valve (ballcock) complying with ANSI/ASSE 1002 (see Fig. 1). Each tank shall have provisions for overflow. The critical level mark on the fill valve (ballcock) shall be a minimum of 1 in. (25 mm) above overflow in the tank. Water closet tank punching details are shown in Fig. 2.

4.8.2 Pressurized Flushing Devices. A product designed to utilize the force contained within the water supply in the establishment of flushing action.

Two general types of pressurized flushing devices may be provided: flushometer valves and flushometer tanks, as defined in Section 3. Such devices shall comply with ASSE 1037.

The critical level of the lowest anti-siphon device within a flushometer tank activated unit shall be a minimum of 1 in. (25 mm) above the spill level of the outer enclosure.

4.9 Off-the-Floor Fixtures

Fixture and fixture supports, when required, shall comply with ASME A112.6.1M.

4.10 Handicapped Installations

See ANSI A117.1.

4.11 Spud Sizes

For spud inlet sizes for fixtures requiring spuds, refer to ASME A112.19.5M.

4.12 Illustrations

The illustrations in Section 10 are shown for convenience in identifying the various fixtures and for locating dimensions. The illustrations are not intended to indicate standard or required designs, and manufacturer's rough-in specifications shall take precedence.

5 FIXTURE DESCRIPTIONS

This Section describes certain fixture styles and types which provide representative selection for ordinary applications. The definitions provided are in-

TABLE 1 MAXIMUM ALLOWABLE BLEMISHES FOR FIRST QUALITY NON-VITREOUS CERAMIC URINALS AND SINKS

Location	Blemish or Defect	Maximum Permitted
General	Wavy finish	Not more than 4 sq in. (2600 mm²)
	Warpage:	Not more than 1/4 in./ft, total (20 mm/m) warpage not more than 1/4 in. (13 mm)
Flushing surface	Spots, blisters, and pinholes	No segregation; a total of not over 5
	Bubbles or specks	Not over 5 in one "pottery square;" a total of not over 10
Visible surface	Exposed body	Not over 1/4 in./ft (20 mm/m); none on more prominent surfaces
	Spots, blisters, and pinholes	No segregation; a total of not over 5
	Bubbles or specks	Not over 3 in one "pottery square;" a total of not over 10

TABLE 2 MAXIMUM ALLOWABLE BLEMISHES FOR FIRST QUALITY NON-VITREOUS CERAMIC CLOSE-COUPLED TANKS AND TANK COVERS[1]

Location	Blemish or Defect	Maximum Permitted
General	Warpage	Not noticeably warped
	Wavy finish	Not more than 4 sq in. (2600 mm²)
	Spots, blisters, and pinholes	No segregation; a total of not over 5
Visible surface	Bubbles or specks	Not over 3 in one "pottery square;" a total of not over 10

NOTE:
(1) Covers shall show not more than 50% of the number of blemishes listed in this Table.

TABLE 3 MAXIMUM ALLOWABLE BLEMISHES FOR FIRST QUALITY NON-VITREOUS CERAMIC LAVATORIES AND DRINKING FOUNTAINS

Location	Blemish or Defect	Maximum Permitted
General	Warpage	Warpage of slab out of horizontal plane not to exceed $\frac{1}{4}$ in. (6 mm) on all sizes; warpage of backs of lavatories which are attached to wall not to exceed $\frac{1}{8}$ in. (3 mm)
	Self-rimming lavatories	$\frac{1}{16}$ in. at any point
Service space, top of slab, inside of bowl, and front of apron	Spots, blisters, and pinholes	No segregation; a total of not more than 2
	Bubbles and specks	No segregation; a total of not more than 4
	Polishing marks	No more than 1 allowed
Face of integral back and sides	Spots, blisters, and pinholes	Not more than 1 on back or on either side; a total of not more than 3
	Bubbles or specks	No segregation; a total of not more than 4

tended primarily to identify and differentiate available types of fixtures. They are not intended to preclude the use of this Standard that fixture performance, rather than physical description and dimensions, be the primary means of evaluating the acceptability of non-vitreous ceramic plumbing fixtures.

5.1 Gravity Type Flush Tanks (See Fig. 1)

5.1.1 Insulated Water Closet Flush Tanks. In order to be considered an insulated tank, the unit shall comply with para. 7.4.

5.1.2 Spud Size for Flush Tanks. Spud sizes shall be 2 in. (50 mm) for water closet bowls operated by flush tanks or flushometer tanks. See ASME A112.19.5 for other dimensions.

5.1.3 Tank Punchings. Tank punchings shall comply with Fig. 2.

5.2 Lavatories

5.2.1 Lavatory Types. Common types are as follows:

5.2.1.1 Lavatories With Back (See Fig. 4). Faucet holes shall be located in top of slab. Nominal sizes: 18 in. × 15 in. (457 mm × 381 mm); 20 in. × 18 in. (508 mm × 457 mm); 24 in. × 20 in. (610 mm × 508 mm) or 21 in. (533 mm).

5.2.1.2 Ledge-Back Lavatories (See Fig. 5). Faucet holes shall be located in top of ledge. Nominal sizes: 19 in. × 17 in. (483 mm × 432 mm); 20 in. × 18 in. (508 mm × 457 mm); 22 in. × 18 in. (559 mm × 457 mm); and 24 in. × 20 in. (610 mm × 508 mm).

5.2.1.3. Shelf-Back Lavatories (See Fig. 6). Faucet hole dimensions are determined by the individual manufacturer. Faucet holes may be located in front wall of shelf-back or in an inclined panel. Nominal sizes: 19 in. × 17 in. (483 mm × 432 mm); 20 in. × 18 in. (508 mm × 457 mm); 22 in. × 18 in. (559 mm × 457 mm); and 24 in. × 20 in. (610 mm × 508 mm).

5.2.1.4 Slab-Type Lavatories (See Fig. 7). Faucet holes shall be located in top of slab. Wall brackets shall be required when lavatory is supported by china or metal legs. Nominal sizes: 20 in. × 18 in. (508 mm × 457 mm); 24 in. × 20 in. (610 mm × 508 mm) or 21 in. (533 mm).

5.2.1.5 Self-Rimming Lavatories (See Figs. 8, 9, 10, and 11). Faucet holes shall be in top of slab. Nominal sizes: rectangular 22 in. × 19 in. (559 mm × 483 mm); 21 in. × 19 in. (533 mm × 483 mm); 19 in. × 16 in. (483 mm × 406 mm); 21 in. × 13 in. (533 mm × 330 mm); oval, 18 in. (457 mm) dia., 20 in. × 17 in. (508 mm × 432 mm), 19 in. × 16 in. (483 mm × 406 mm), 19 in. × 15 in. (483 mm × 381 mm); round 19 in. (483 mm) diameter.

5.2.1.6 Corner Lavatories With Shelf Back (See Fig. 12). Faucet hole dimensions are determined by the individual manufacturer. Faucet holes may be located in front of wall of back shelf or in inclined panel. Nominal size: 17 in. × 17 in. (432 mm × 432 mm).

5.2.2 Faucet Holes and Outlet Dimensions

5.2.2.1 Faucet Holes. Faucet hole dimensions are shown in Fig. 3, sketches (a) and (b). Shelf-back and corner lavatory faucet hole dimensions may be determined by the individual manufacturer.

5.2.2.2 Outlet Dimensions. Outlet dimensions are shown in Fig. 3, sketch (c).

5.3 Urinals

5.3.1 Urinal Types

5.3.1.1 Wall-Hanging Washout Urinal With Bottom Outlet (See Fig. 13). Fixture shall have top inlet, bottom outlet, either a flushing rim or a flush spreader, and a separate, removable strainer; integral strainer; or open trapway.

5.3.2 Handicapped Installations. See ANSI A117.1.

5.3.3 Water Consumption. Water consumption (total flush volume) shall be defined and tested in accordance with ASME A112.19.6M.

5.3.4 Spud Sizes for Urinals. The standard sizes for spuds in washout urinals may be $^1/_2$ in. or $^3/_4$ in. for inlet spuds and $^3/_4$ in. to 2 in. for outlet spuds.

5.4 Service Sinks

5.4.1 Service Sink With Splash Back. Fixture shall have integral back. Faucet hole drillings, when provided, shall conform to Fig. 14.

5.4.2 Service Sink Without Back. Service sink without back is shown in Fig. 14.

5.4.3 Outlet. Outlets for service sinks are shown in Fig. 15.

5.5 Drinking Fountains

5.5.1 Drinking Fountains. Fixture shall have integral bowl with beveled rounded corners or edges and be designed for minimal splashing of water. Fixtures may have integral strainers. The nozzle head base shall be above the level of the overflow point of bowl rim. Drinking fountains shall comply with the applicable requirements of ASME A112.18.1 and ANSI/ARI 1010.

5.5.2 Drinking Fountain Types

(a) Drinking Fountain With Splash Back. See Fig. 16.

(b) Drinking Fountain, Semi-Recessed. See Fig. 17.

(c) Drinking Fountain, Recessed. See Fig. 18.

5.6 Bidets (See Fig. 19)

5.6.1 Bidet. General fixtures shall have a rim height of 14 in. to 16 in., a variable rough-in based upon the fitting used, and a $1^1/_4$ in. waste. Bidet fittings may be either wall- or deck-mounted. Bidets may be furnished with or without the following features: transfer valve, overflow, spray, or washing rim.

5.6.2 Backflow Protection. Backflow protection in bidets shall be in accordance with ANSI A112.1.2 or ANSI/ASSE 1001.

5.7 Kitchen Sinks

Common types and sizes are as follows.

5.7.1 Self-Rimming, Single Compartment Kitchen Sinks With Center Outlet. Sizes are 24 in. × 21 in. (609.60 mm × 533.40 mm) and 25 in. × 22 in. (635.00 mm × 558.80 mm) (see Fig. 20).

5.7.2 Self-Rimming Double Compartment Kitchen Sinks. Size is 32 to 33 in. × 22 in. (812.80 to 838.20 mm × 558.80 mm) (see Fig. 21).

5.7.3 Kitchen Sink Outlet Dimensions. The dimensional limits for outlets of kitchen sinks are shown in Fig. 22.

5.8 Bathtubs

5.8.1 Dimensions. The dimension for bathtubs shall be the manufacturer's stated dimensions.

5.8.2 Overflows. Common dimensions for bathtub overflows shall comply with Fig. 23.

5.9 Shower Receptors

5.9.1 Dimensions. The dimensions for shower receptors shall be the manufacturer's stated dimensions.

5.9.2 Outlet. Outlets on shower receptors shall be consistent with IAPMO PS-4.

6 METHOD OF GRADING

6.1 Evaluation of Surface Finish

It is not intended that manufacturing plant inspectors measure or count any blemishes except in case of doubt, since with practice, dimensional limits and numbers can be readily gauged by eye. The light source shall be partially diffused daylight, supplemented, if necessary, with diffused artificial light, giving an illumination intensity near the surface to be inspected at a minimum of 100 foot-candles (1076 lx).

6.1.1 Fixtures shall be examined for minor blemishes with the eyes of the observer about 2 ft (0.5 m) directly above the rim while the fixture is rocked to each side and backward to an angle of about 45 deg. Minor blemishes not observed in this procedure shall be assumed to be on unseen surfaces.

6.1.2 Urinals, sinks, service sinks, and pedestals and legs shall be graded in accordance with Table 1. Blemishes such as crazes, dull or eggshell finishes, dunts, fire checks, large blisters, and projections shall not be allowed. No exposed body shall be allowed on the flushing surface or on visible surfaces.

6.1.3 Close-coupled tanks and tank covers shall be graded in accordance with Table 2. Examination shall be made with the eye of the observer about 2 ft (0.5 m) from the surface observed. No blemishes on the inside surface below the water surface shall be permitted. Minor blemishes on the surface above the water line, where hidden by the cover, shall not be counted. Blemishes such as crazes, dull or eggshell finishes, dunts, exposed body, fire checks, large blisters, and projections shall not be allowed.

6.1.4 Lavatories and drinking fountains shall be graded in accordance with Table 3. The fixtures shall be examined with the eyes of the observer about 2 ft (0.5 m) from the surface observed. (Pedestals and legs shall be graded the same as sinks.) Blemishes such as crazes, dull or eggshell finishes, dunts, exposed body, fire checks, large blisters, and projections shall not be allowed.

6.1.5 For non-vitreous ceramic plumbing fixtures not specifically mentioned in para. 6.1.4, the grading rules in Table 1 shall apply.

7 PERFORMANCE TESTS

7.1 Crazing Test

A test specimen with a glazed surface not more than $^5/_8$ in. (16 mm) thick by approximately 5 in.^{2} (3200 mm^2) shall be suspended in a solution of equal portions by weight, of anhydrous calcium chloride and water, and then maintained at a constant temperature of 230°F ±5°F (110°C ±3°C) for $1^1/_2$ hr. It shall then be removed and immediately plunged into an ice water bath at 37°F ±1°F (2.5°C ±0.5°C) until chilled. The specimen shall then be soaked for 12 hr in a 1% solution of methylene blue dye, after which it shall be examined for craze lines as indicated by penetration of blue dye. No crazing shall be permitted.

7.2 Warpage Test

The fixture shall be placed on a flat surface so as to ascertain the amount of deviation from the horizontal plane that exists at the edges of the fixture. If a feeler gage of thickness equal to the total allowable warpage will not slide under the fixture without forcing, the fixture satisfactorily comes within the warpage limitations. If the fixture will rock on two opposite corners, the horizontal plane shall be determined by placing one feeler gage, as thick as the total warpage allowed, under a corner that does not touch the plane and then forcing the fixture down on this gage. If a second feeler gage of the same thickness will not slide under the fixture at any other point, the fixture shall not be considered warped out of horizontal plane by more than the specified tolerance, and shall be deemed as satisfactorily coming within the warpage limitations.

7.3 Load Tests

All units to be tested shall be installed on the hanger, when supplied by the manufacturer, or shall be firmly affixed to a solid test stand in accordance with manufacturer's instructions. In all cases, the fixture shall withstand the full load for 10 min without visible failure, cracks, or leakage. Crack inspection shall be made with a contrasting link.

7.3.1 Wall-Hung Urinals and Drinking Fountains. Urinals and drinking fountains shall withstand an applied vertical load of 50 lb (22.7 kg) on the top surface on the front of the fixture.

7.3.2 Bidets. Place 2 steel channels, 3 in. in depth and approximately 2 ft long, back to back and spaced 3 in. apart with bumpers. Fillet weld a $^1/_4$ in. steel plate of convenient size to the top flange of the channels. Adhere $^1/_2$ in. (13 mm) thickness of sponge rubber to channel edges which will rest on the fixture surface. Place the channels across the fixture surface and center them at a distance of 12 in. measured normal to the center line . Apply a load of 300 lb including the weight of the channels and plate.

7.3.3 Wall-Hung and Pedestal Lavatories. Lavatories shall withstand an applied vertical load of 250 lb (113.4 kg) on the top surface on the front of the fixture .

7.3.4 Kitchen Sinks and Service Sinks

7.3.4.1 The load shall be applied through a 3 in. (76 mm) diameter rigid metal disk resting on a $^1/_2$ in. (13 mm) thickness of sponge rubber or other suitable soft material between the disk and the surface being tested. The load points shall be at the center of the largest sink compartment and the largest integral top area, if any. The loads which shall be applied are 200 lb (91 kg) for compartments or integral tops having a span of 30 in. (760 mm) or more and 100 lb (45 kg) for compartments or integral tops having a span of less than 30 in. (760 mm). The load shall be applied for 5 min and removed. The unit shall be inspected for damage, chipping, or cracks.

7.3.5 Bathtubs. A preload weight of 300 + 5 lb (1335 + 22 N force) shall be applied to the center of the bottom of the unit on a weight distribution disk 3 in. (76 mm) in diameter covered by a $^1/_2$ in. (13 mm) thickness of sponge rubber or other suitable soft material between the disk and the surface being loaded. The 300 lb (1335 N force) load shall also be applied at two other points on the bottom of the unit and at two points on the top of the rim, one at the midpoint and one near an end, for the purpose of checking for cracks only (see Fig. 24).

7.3.6 Shower Receptors. A preload weight of 300 + 5 lb (1334.4 + 22.25 N force) shall be applied to the center of the bottom of the unit on a weight distribution disk 3 in. (376.2 mm) in diameter covered by a $^1/_2$ in. (13 mm) thickness of sponge rubber or other suitable soft material between the disk and the surface being loaded. The 300 lb (1334.4 N force)

load shall also be applied at two other points on the bottom of the unit and at two points on the top of the rim (see Fig. 25).

7.4 Insulated Tank Test

Test insulated tanks in an environmental chamber or room. Adjust water temperature to 45°F ±2°F (7°C ±1°C) and the ambient temperature conditions, as follows:

(a) dry bulb temperature — 80°F ±2°F (26°C ±2°C)

(b) wet bulb temperature — 70°F ±2°F (21°C ±1°C)

(c) relative humidity — 63% ±3%

(d) air velocity on any point of the tank exterior surface — 50 fpm [max] (0.254 m/s)

Maintain the above conditions for a period of 3 hr. There shall be no condensation on the tank exterior before removing the tank from the chamber.

7.5 Lavatory Overflow Test

The lavatory shall be installed in a stand with a standard mechanical waste fitting. The rate of water supply shall be adjusted to 3 gal/min. Close the waste outlet. The elapsed time from the onset of water flowing into the overflow opening until the water begins to overflow the flood level shall be measured. The fixture shall drain for five minutes without overflowing.

8 MARKING

Each fixture (or each fixture component, if fixture is comprised of two or more components) shall be marked with the manufacturer's name or registered trademark, or, in the case of private labeling, of the customer for whom the unit was manufactured. This mark shall be legible, readily identified, and applied so as to be permanent. The mark shall be located so as to be visible after the fixture is installed, except for fixtures built into or for a counter or cabinet.

Each fixture shall be labeled with the designation ASME A112.19.9M.

8.1 Seconds

All second-grade ware shall be indelibly marked by the manufacturer with two parallel lines cut through the glaze into the body of the ware at the locations shown in Fig. 24. These cuts shall be filled with a bright red permanent marking which is resistant to the action of hot water. No label shall be placed on seconds.

8.1.1 All packages containing seconds ("B" grade) shall be clearly identified with two red marks adjacent to fixture identification.

9 RECOMMENDATIONS

9.1 Control Valves (Stops)

It is recommended that control valves (stops) be installed with every non-vitreous ceramic plumbing fixture as a means of regulating or stopping the flow of water to supply fittings. This facilitates servicing of fittings, such as the replacement of faucet washers and O-rings.

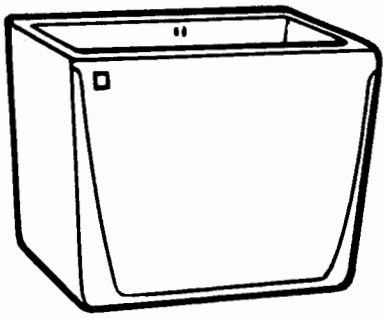
9.2 Water Pressure

For safe and efficient operation, it is recommended that static pressures at plumbing fixtures be not less than 20 psig (140 kPa) and no more than 80 psig (550 kPa).

9.3 Protection of Fixture Against Abuse

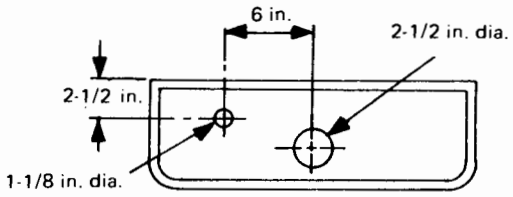
In line with good plumbing practice, it is recommended that the following paragraph be included in architect's and builder's specifications.

> "All plumbing fixtures shall be protected from damage before, during, and after their installation and until work is completed and accepted. Plumbing fixtures shall not be used for purposes other than those for which they were intended, such as storage of tools or materials, or as supports or platforms. Care shall be taken during the period of construction to avoid damage to fixtures, fittings, and trim."



NOTE: Dimensions variable per manufacturer's design.

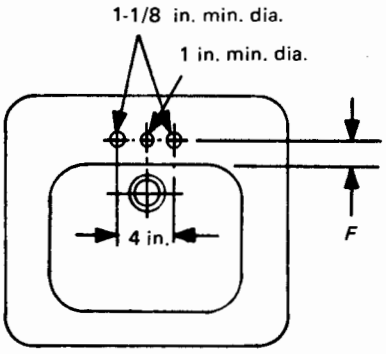
FIG. 1 GRAVITY TYPE FLUSH TANK
(Para. 5.1)



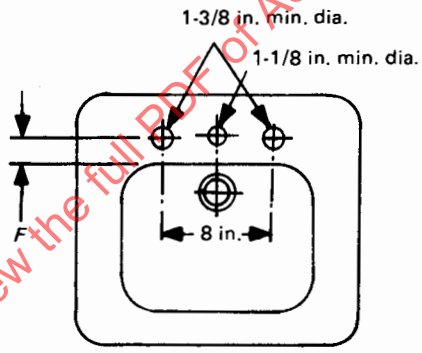
Top View

NOTE: Design of tank is determined by the manufacturer.

FIG. 2 TYPICAL WATER CLOSET TANK
PUNCHING DETAILS (Para. 5.1.3)

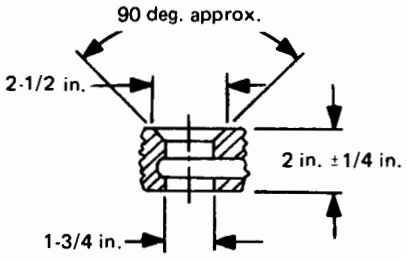


(a) Punchings for Centerset Supply Fittings



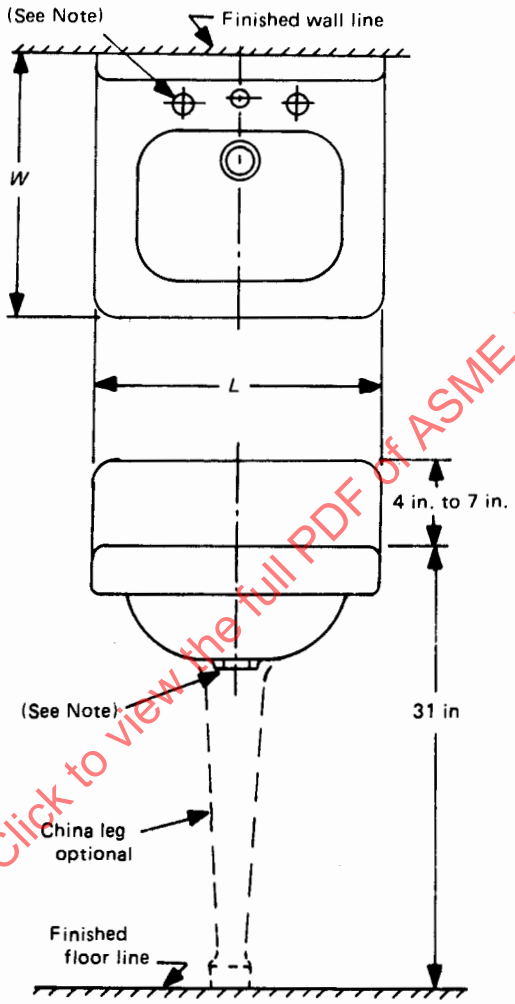
(b) Punchings for Separate Faucets and Combination Supply Fittings

NOTE: For lavatories with front overflow, dimension F = 2 in. maximum.



(c) Lavatory Outlet Dimensions

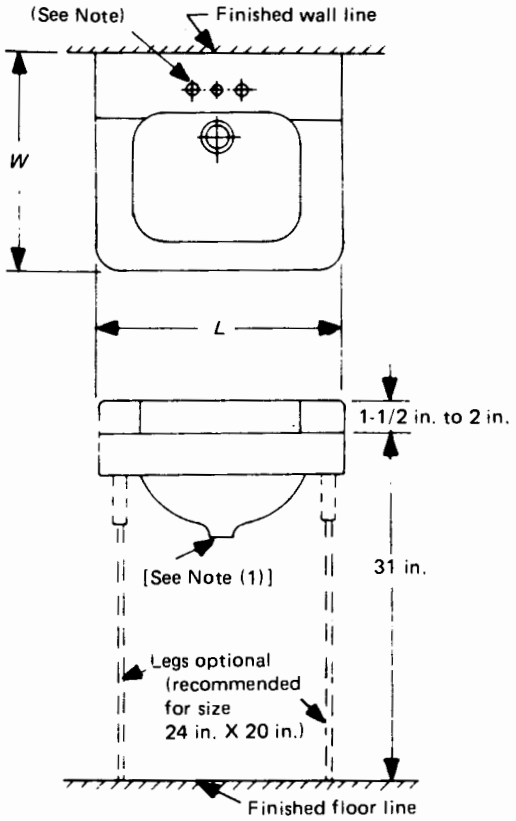
FIG. 3 LAVATORY SUPPLY PUNCHINGS AND OUTLET DETAILS (Para. 5.2.2)



Common Sizes, in.	
L	*W*
18	15
20	18
24	20 or 21

NOTE: Supply punchings and outlet as shown in Fig. 3, sketches (a), (b), and (c).

FIG. 4 LAVATORIES WITH BACK (Para. 5.2.1.1)

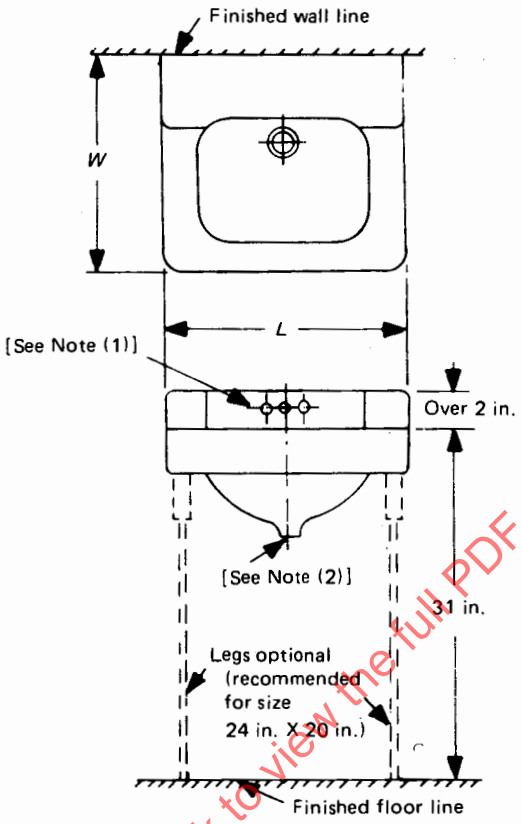


Common Sizes, in.

L	W
19	17
20	18
22	18
24	20

NOTE: Supply punchings and outlet as shown Fig. 3 sketches (a) and (c)

FIG. 5 LEDGE-BACK LAVATORIES (Para. 5.2.1.2)

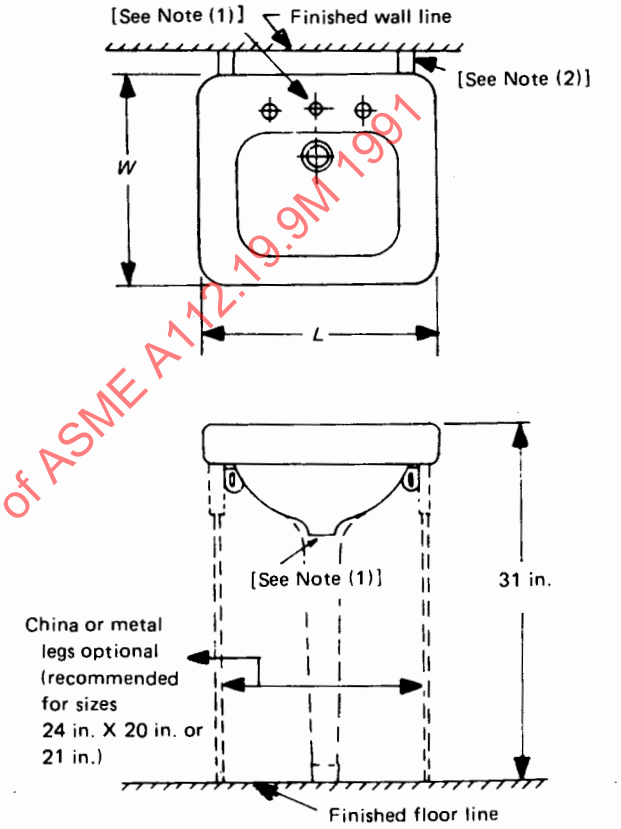


Common Sizes, in.

L	W
19	17
20	18
22	18
24	20

NOTES: (1) Faucet hole sizes and locations as determined by manufacturer.
(2) Outlet as shown in Fig. 3, sketch (c)

FIG. 6 SHELF-BACK LAVATORIES (Para. 5.2.1.3)

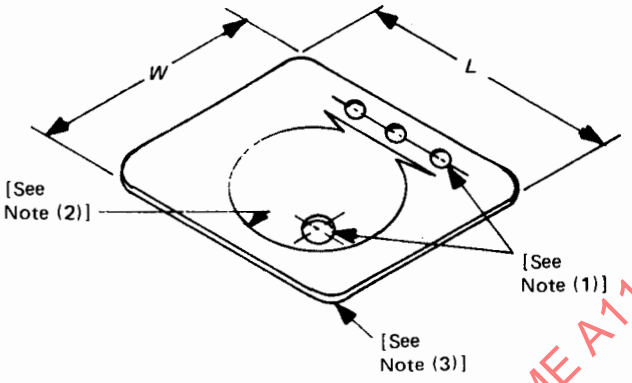


Common Sizes, in.

L	W
20	18
24	20 or 21

NOTES: (1) Supply punchings and outlet as shown in Fig. 3, sketches (a), (b), and (c).
(2) Wall brackets required when supported by china or metal legs.

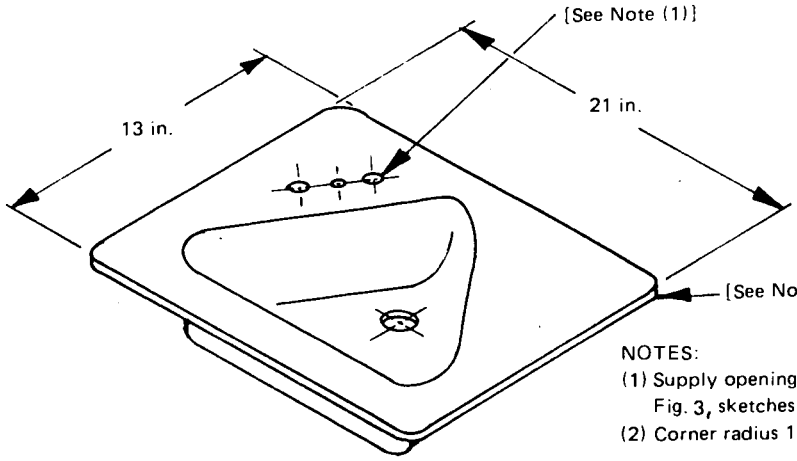
FIG. 7 SLAB-TYPE LAVATORIES (Para. 5.2.1.4)



Common Sizes, in.	
L	*W*
22	19
21	19
19	16

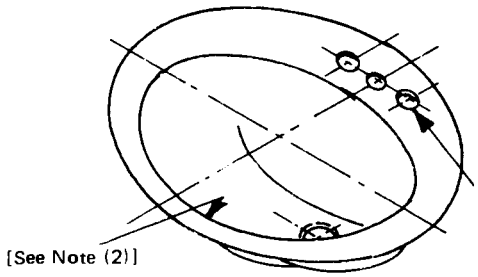
NOTES: (1) Supply openings and outlet as shown in Fig. 3
(2) Overflow may be at front or rear.
(3) Corner radius — 1-1/2 ·1/16 in.

FIG. 8 RECTANGULAR SELF-RIMMING LAVATORY (Para. 5.2.1.5)



NOTES:
(1) Supply openings and outlets as shown in Fig. 3, sketches (a), (b), and (c).
(2) Corner radius 1-3/4 in. ± 3/16 in.

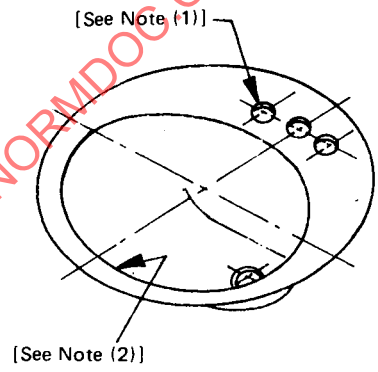
FIG. 9 SELF-RIMMING LAVATORY, RECTANGULAR (Para. 5.2.1.5)



Common Sizes, in
20 X 17
19 X 15

NOTES:
(1) Supply openings and outlets as shown in Fig. 3, sketches (a), (b), and (c).
(2) Overflow may be at front or rear.

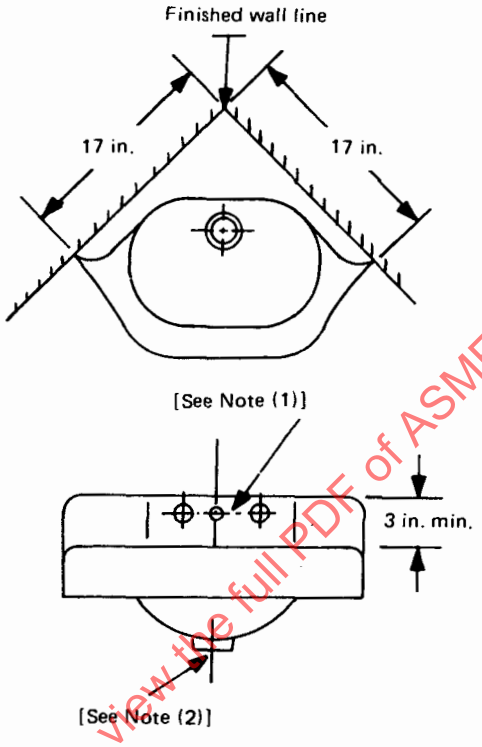
FIG. 10 SELF-RIMMING LAVATORY, OVAL (Para. 5.2.1.5)



NOTES:
(1) Supply openings and outlets as shown in Fig. 3, sketches (a), (b), and (c).
(2) Overflow may be at front or rear.

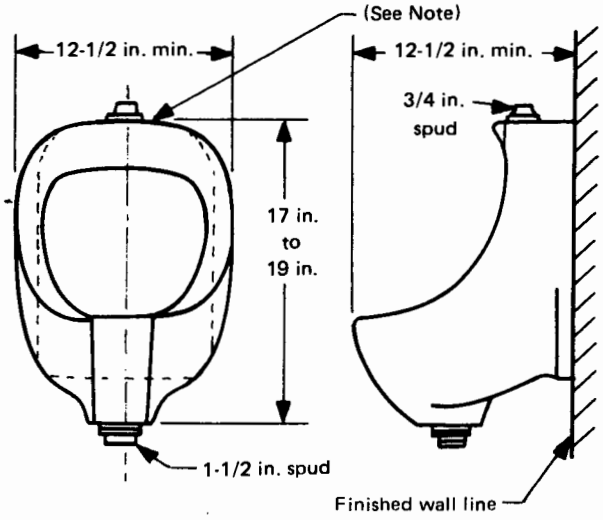
Common Sizes, in.
18 Dia.
19 Dia.

FIG. 11 SELF-RIMMING LAVATORY, ROUND (Para. 5.2.1.5)



NOTE: (1) Faucet hole size and location, as determined by manufacturer.
(2) Outlet as shown in Fig. 3, sketch (c).

FIG. 12 CORNER LAVATORIES WITH SHELF BACK (Para. 5.2.1.6)



NOTE: May have flat top and concealed hanger.

FIG. 13 WALL-HANGING WASHOUT URINAL WITH BOTTOM OUTLET (Para. 5.3.1.1)

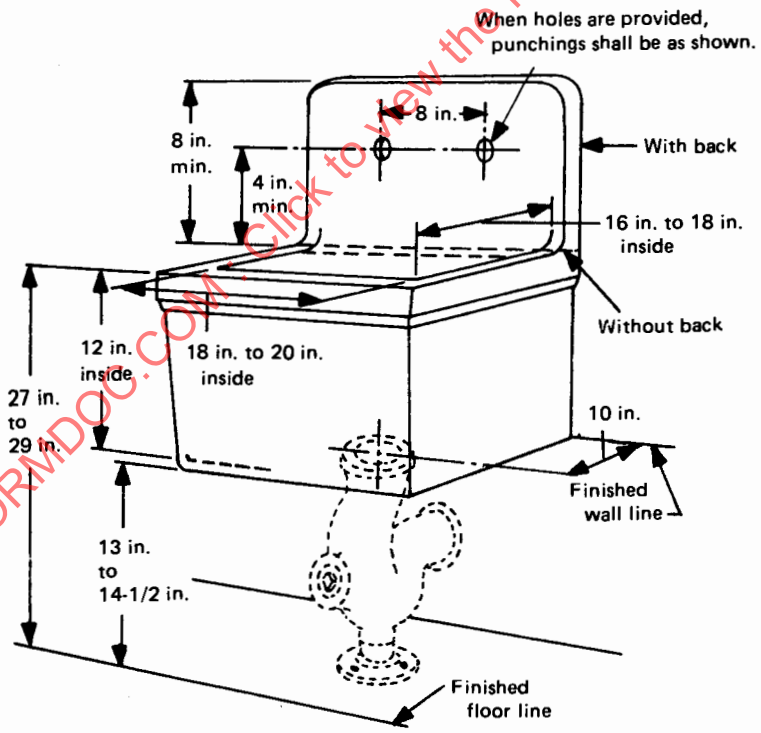


FIG. 14 SERVICE SINK (Para. 5.4.1)

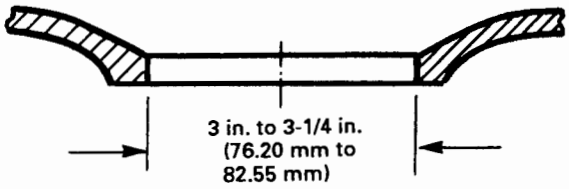


FIG. 15 SERVICE SINK OUTLET
(Para. 5.4.3)

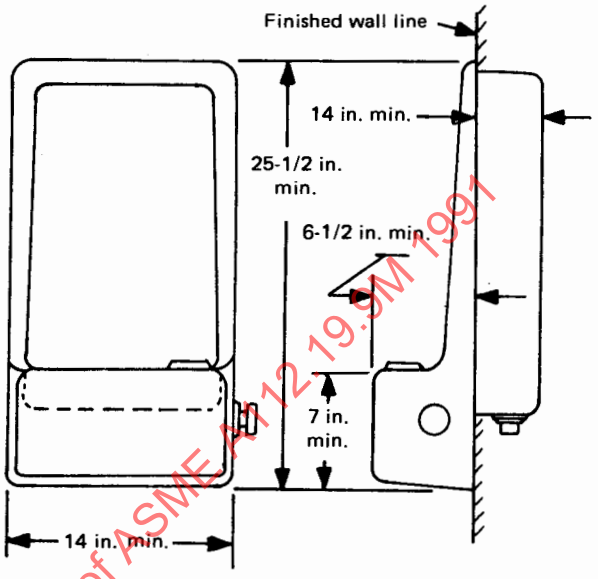


FIG. 17 DRINKING FOUNTAIN, SEMI-RECESSED (Para. 5.5.2.(b))

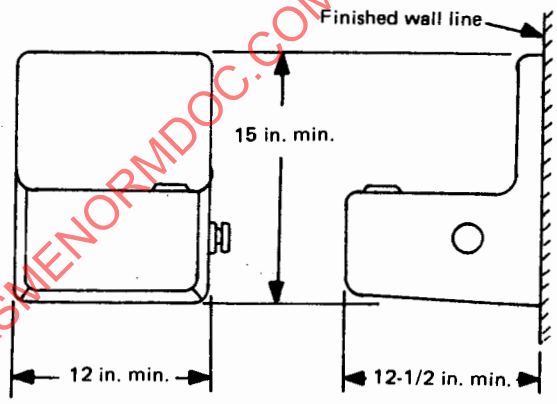


FIG. 16 DRINKING FOUNTAIN WITH BACK (Para. 5.5.2.(a))

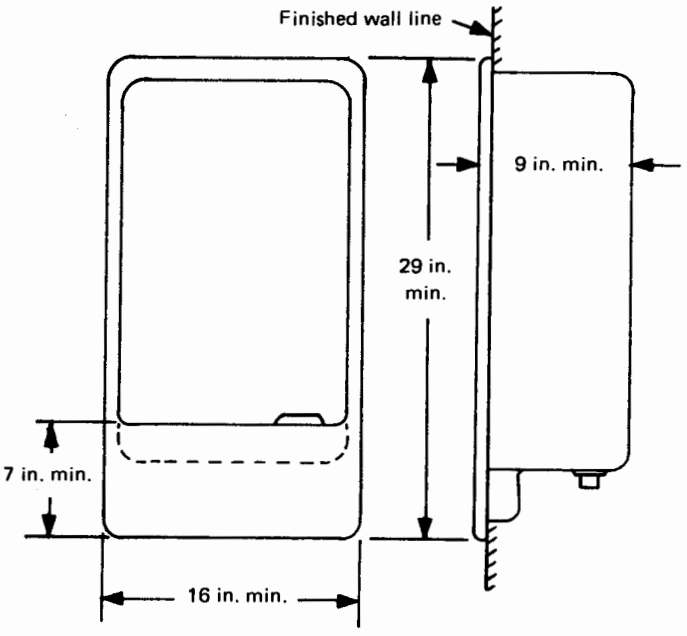
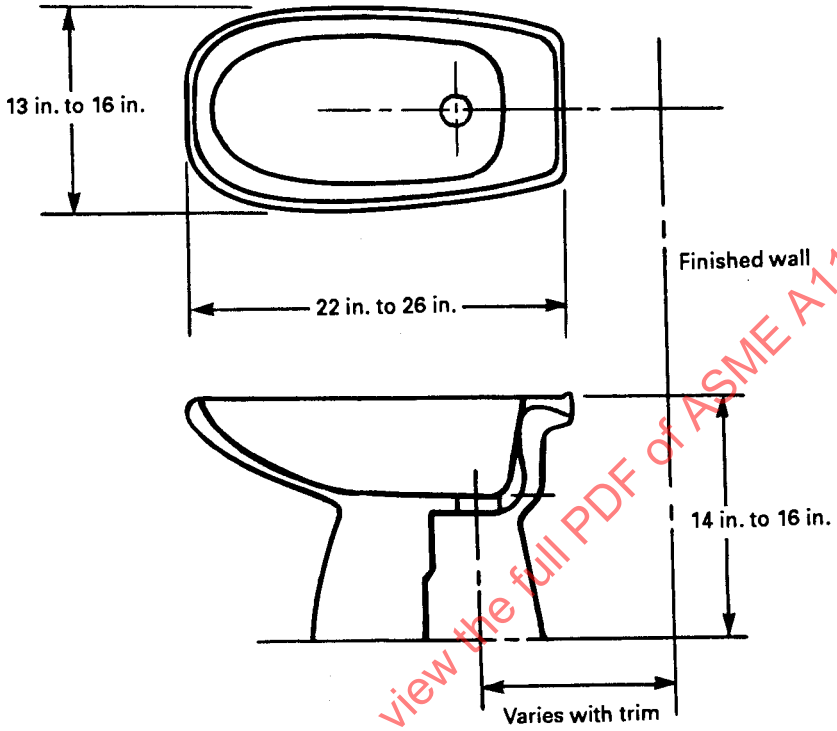
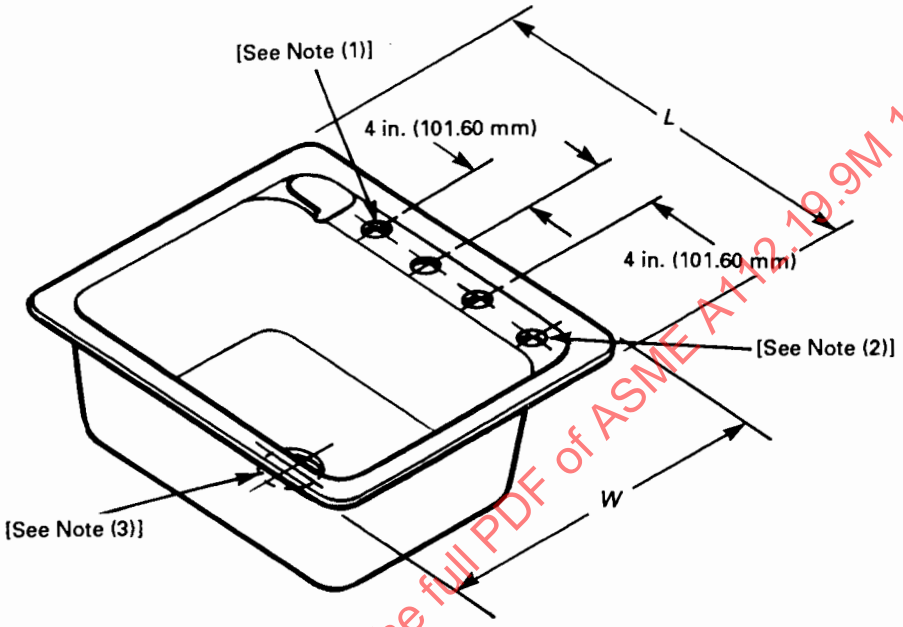


FIG. 18 DRINKING FOUNTAIN, RECESSED (Para. 5.5.2.(c))



NOTE:
(1) Supply punchings and outlet as shown in Fig. 2, sketches (a), (b), and (c).

FIG. 19 BIDET (Para. 5.6)

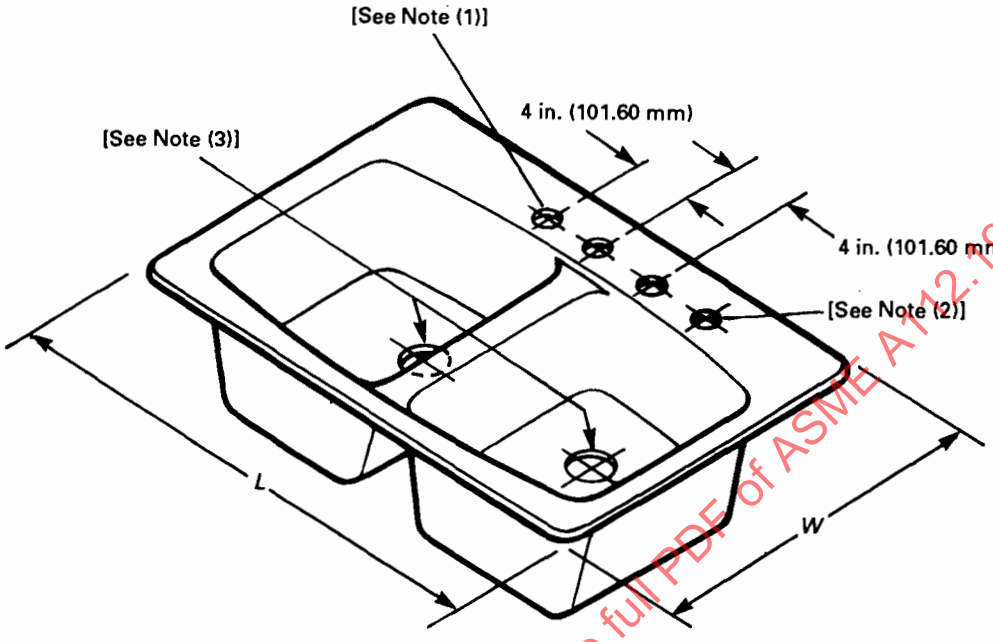


Sizes, in. (mm)	
L	*W*
24 (609.60)	21 (533.40)
25 (635.00)	22 (558.80)

NOTES:

(1) All holes are 1-3/8 in. ±1/8 in. (34.92 mm ±3.18 mm) diameter. Supply holes may be in an inclined panel above ledge, in which case distance between centers may be 4-1/2 in. (114.30 mm).
(2) Spray hole and its location are optional.
(3) Outlet is shown in Fig. 23.

FIG. 20 SELF-RIMMING KITCHEN SINKS WITH CENTER OUTLET (Para. 5.7.1)



Sizes, in. (mm)	
L	*W*
32 to 33 (812.80 to 838.20)	22 (558.80)

NOTES:

(1) All holes are 1-3/8 in. ±1/8 in. (34.92 mm ±3.18 mm) diameter. Supply holes may be in an inclined panel above ledge, in which case distance between centers may be 4-1/2 in. (114.30 mm).
(2) Spray hole and its location are optional.
(3) Outlet is shown in Fig. 23.

FIG. 21 SELF-RIMMING DOUBLE COMPARTMENT KITCHEN SINKS (Para. 5.7.2)