AN AMERICAN NATIONAL STANDARD

Porcelain Enameled Formed Steel Plumbing Fixtures

ASME A112.19.4M-1994

(REVISION OF ANSI/ASME A112.19.4M-1984)

The American Society of Mechanical Engineers

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

Supplement 2-2000

to

ASME A112.19.4M-1994
Porcelain Enameled
Formed Steel Plumbing Fixtures

(This Supplement was approved as an American National Standard on April 27, 2000.)

Paragraph 4.2.2 has been revised. The revised paragraph appears below.

4.2.2 Lavatory Overflows (Optional). When provided, lavatory overflows shall have either a minimum cross-sectional area not less than 725 mm^2 ($1\frac{1}{8}$ $in.^2$) at every point in the passageway or shall have a minimum flow capacity as specified in ASME A112.18.1 for lavatory faucets when tested in accordance with para. 5.4. The location of the overflow shall be optional.

Paragraph 5.4. has been revised. The revised paragraph appears below.

5.4 Lavatory Overflow Test

The lavatory shall be installed with a standard mechanical waste fitting and the lavatory leveled in a stand. The waste outlet shall be closed and the water supply adjusted to supply water to the fixture at a rate as specified in ASME A112.18.1 for lavatory faucet. 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 a minimum of 5 minutes from the onset of water flowing into the overflow opening, without overflowing the flood level.

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JUNE 2000

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Supplement 1-1998
to
ASME A112.19.4M-1994
Porcelain Enameled Formed Steel Plumbing Fixtures

(This Supplement was approved as an American Standard on September 9, 1998.)

Paragraph 3.3.6 has been revised. The revised paragraph appears below. Figure 2 is a new figure which supercedes Fig. 2 of the edition. The new figure appears on the overleaf.

3.3.6 Slip Resistance. The bathing surface of a bathtub shall be treated in such a manner that it shall comply with ASTM F 462. Treatment shall start 2 in. measured from all side and wall radii and 3 in. measured from the centerline of the drain and from the compound corner radii. See Fig. 2.

Paragraph 4.2.2 has been revised. The revised paragraph appears below.

4.2.2 Lavatory Overflows (Optional). The provision of an overflow and its location shall be at the option of the manufacturer. If an overflow is provided, it shall meet the following requirements:

(a) its minimum net cross-sectional area shall be $1\frac{1}{8}$ in.^{2} (725.8 mm^2); or

(b) it shall be capable of preventing the lavatory from overflowing for a minimum of 5 minutes when tested in accordance with para. 5.4.

Paragraph 5.4 has been added. The new paragraph appears below.

5.4 Lavatory Overflow Test

The lavatory shall be installed in a level stand with the waste outlet closed or blocked. A water supply shall be adjusted and shall be supplied to the fixture at a rate of 2.5 gpm (9.5 L/min). Elapsed time shall be measured beginning with the onset of water flowing into the overflow opening. The fixture shall drain for a minimum of 5 minutes without overflowing.

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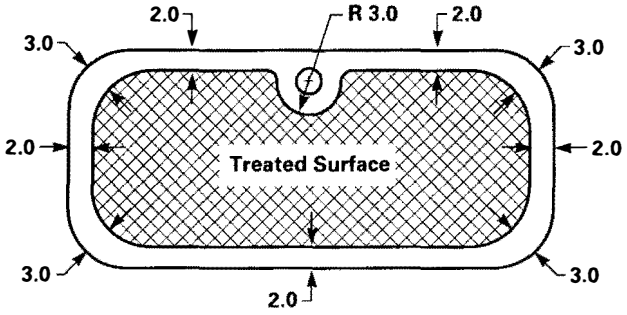
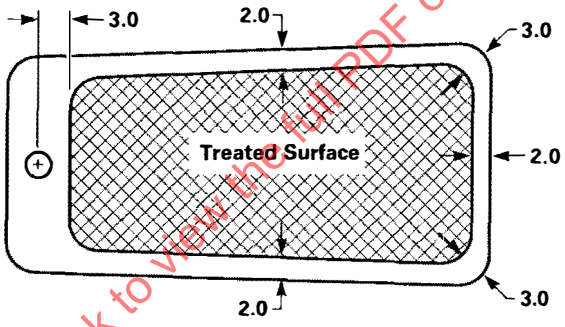
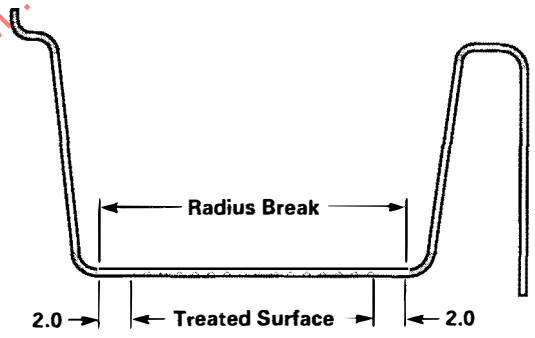


Center Drain Tub



Left or Right Hand
Drain Bathtubs



Cross-Section View

FIG. 2 SLIP RESISTANCE COVERAGE IN BATHTUB SURFACES

Errata
to
ASME A112.19.4M-1994
Porcelain Enameled Formed Steel Plumbing Fixtures

The Errata corrections listed below apply to ASME A112.19.4M-1994, Porcelain Enameled Formed Steel Plumbing Fixtures. This Errata to the 1994 edition is being issued in the form of replacement pages. Corrections are incorporated directly into the affected pages. Replace or insert the pages listed. It is also advisable that this cover page be retained for reference. The pages show the corrections given below. The pages not listed are the reverse sides of the listed pages and contain no changes.

Page	Location	Change
17–19	Appendix A	*Revised in its entirety*

NOVEMBER 1996

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
345 East 47th Street, New York, NY 10017

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APPENDIX A
GOVERNMENT REQUIREMENTS

(This Appendix is not part of ASME A112.19.4M-1994 and is included for Federal Government use only.)

A1 SCOPE

This Appendix covers requirements of the Federal Government for the procurement of porcelain enameled formed steel plumbing fixtures.

A2 APPLICABLE DOCUMENTS

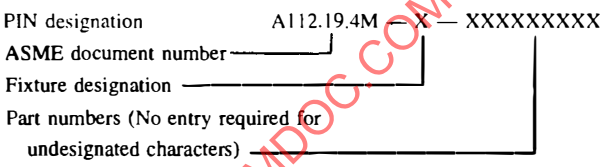
The following document, of the issues in effect on date of invitation for bids or request for proposal, forms a part of this Appendix to the extent specified herein.

ANSI/ASQC Z1.4[1] — Sampling Procedures and Tables for Inspection by Attributes

A3 REQUIREMENTS

A3.1 Part or Identifying Number (PIN)

The plumbing fixtures covered by ASME A112.19.4M-1994 shall be identified by a PIN. This part number is intended for cataloging and ordering purposes (see para. A6) and not for surface marking on the product. The PIN shall be written as shown:



A3.1.1 Part Numbers for Bathtub (Fixture Designation = 1)

(a) First character denotes type.
A = Corner bathtub with straight front
B = Corner bathtub with extended front
C = Recess bathtub with straight front
D = Recess bathtub with extended front
E = Recess bathtub with extended back ledge
F = Drop-in or Island type (with tiling flange)
G = Drop-in or Island type (without tiling flange)

(b) Second character denotes location of overflow and drain outlet.
1 = Left hand
2 = Right hand

(c) Third character denotes nominal size (length × width × height) in inches.
A = 54 × 30 × (14 through 18)
B = 60 × 30 × (14 through 18)

(d) Fourth character denotes rough-in.
1 = conventional (through the floor drain)
2 = Nonconventional (above the floor drain)

(e) Fifth character denotes slip resistance.
A = Required
B = Not Required

(f) Sixth character denotes color.
A = White
B = As specified (see para. A6)

A3.1.2 Part Numbers for Lavatory (Fixture Designation = 2)

(a) First character denotes type.
A = Flat-rim with ledge
B = Self-rimming with ledge

(b) Second character denotes overflow.
1 = Required
2 = Not required

(c) Third character denotes nominal size (inches) and shape.
A = 19 × 16 Rectangular
B = 20 × 18 Rectangular
C = 19 × 16 Oval
D = 20 × 17 Oval
E = 18 Round
F = 19 Round

(d) Fourth character denotes faucet hole punching.
1 = Three holes (2-inch centers) 4 in. center set
2 = Three holes (4-inch centers) 8 in. widespread

(e) Fifth character denotes color.
A = White
B = As specified (see para. A6)

[1]ASQC standards are available from the American Society for Quality Control, 611 East Wisconsin Ave., Milwaukee, WI 53201.

A3.1.3 Part Numbers for Sinks (Fixture Designation = 3)

(a) First character denotes style.

A = Flat-rim
B = Flat-rim with ledge
C = Flat-rim (reversible)
D = Self-rimming
E = Self-rimming with ledge
F = Self-rimming (reversible)

(b) Second character denotes number of compartments.

1 = Single
2 = Double

(c) Third character denotes nominal size (inches).

A = 20 × 16
B = 24 × 18
C = 24 × 20
D = 24 × 21
E = 30 × 20
F = 30 × 21
G = 32 × 16
H = 32 × 20
J = 32 × 21

(d) Fourth character denotes faucet hole punching.

1 = No hole
2 = Three holes
3 = Four holes

(e) Fifth character denotes color.

1 = White
2 = As specified (see para. A6)

A3.2 Standard Commercial Product

The plumbing fixtures shall, as a minimum, be in accordance with the requirements of ASME A112.19.4M-1994. Additional or better features which are not specifically prohibited by this standard but which are a part of the manufacturer's standard commercial product, shall be included in the plumbing fixtures being furnished. A standard commercial product is a product which has been sold or is being currently offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

A4 QUALITY ASSURANCE PROVISIONS

A4.1 Responsibility for Inspection

The contractor shall be responsible for the performance of all inspection requirements as specified herein. The contractor may use his own or any other facilities suitable for the performance of the inspection requirements unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the standard where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

A4.2 Quality Conformance Inspection

When specified (see para. A6), a quality conformance inspection shall be required. The quality conformance inspection shall be performed on each sample selected (see para. A4.3) to determine compliance with ASME A112.19.4M-1994 and shall include the following:

(a) Examination. This element of inspection shall encompass all visual examination and dimensional measurements. Noncompliance with any specified requirements shall constitute one defect. Examination shall be based on inspection level S-4 and an Acceptable Quality Level (AQL) of 2.5 percent defective.

(b) Test. Each sampled fixture shall be tested in accordance with the applicable performance test in this standard. Failure to pass any test constitutes one defect. Test shall be based on inspection level S-2 and an AQL of 4.0% defective.

(c) Preparation for Delivery Inspection. Preparation for delivery shall be inspected for compliance with the requirements of para. A5.

A4.3 Sampling

Sampling and inspection procedures shall be in accordance with ANSI/ASQC Z1.4. The unit of product shall be one complete fixture. All fixtures of the same description offered for delivery at one time shall be considered a lot for the purpose of inspection. If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units, and resubmit for a complete inspection. Resubmitted lots shall be reinspected using tightened inspection. If the rejected lot was screened, reinspection shall be limited to the defect causing rejection. If the lot was reprocesses, reinspection shall be performed for all defects. Rejected lots shall be separated from new lots, and shall be clearly identified as reinspected lots.

A5 PREPARATION FOR DELIVERY

The packaging, packing, and marking shall be as specified in the contract or purchase order (see para. A6).

A6 ORDERING DATA

Acquisition documents should identify the following:

(a) title, number, and date of the standard;

(b) PIN designation (see para. A3.1);

(c) color [see paras. A3.1.1(f), A3.1.2(e), and A3.1.3(e)];

(d) when a quality conformance inspection is required (see para. A4.2);

(e) preparation for delivery (see para. A5).

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AN AMERICAN NATIONAL STANDARD

Porcelain Enameled Formed Steel Plumbing Fixtures

ASME A112.19.4M-1994

(REVISION OF ANSI/ASME A112.19.4M-1984)

The American Society of Mechanical Engineers

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

Date of Issuance: December 16, 1994

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 A112.19.4M-1994.)

The American National Standards Committee A112 was organized July 27, 1955, for the standardization of plumbing materials and equipment. The first organizational meeting was held on July 22, 1958. On April 1, 1982, the Committee was reorganized as an ASME Standards Committee operating under the ANSI Accredited Organization Method. At the meeting on May 1, 1964, Panel No. 19 was created to establish standards on plumbing fixtures. Its scope was as follows: the recommendation of suitable existing standards, in cooperation with interested sponsors, or the development of adequate new standards as needed for plumbing fixtures used or installed in plumbing systems.

This Standard was approved by the ASME A112 Standards Committee, Standardization of Plumbing Materials and Equipment, and Panel 19 on Plumbing Fixtures.

The American National Standards Institute approved it as an American National Standard on August 19, 1994.

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ASME STANDARDS COMMITTEE A112
Standardization of Plumbing Materials and Equipment

(The following is the roster of the Committee at the time of approval of this Standard.)

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CONTENTS

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PORCELAIN ENAMELED FORMED STEEL PLUMBING FIXTURES

1 PURPOSE, SCOPE, AND REFERENCE STANDARDS

1.1 Purpose

The purposes of this Standard are to provide a nationally recognized standard for the guidance of manufacturers, distributors, and purchasers of porcelain enameled formed steel plumbing fixtures, and to promote better understanding between suppliers and users regarding these fixtures.

1.2 Scope

This Standard covers materials, methods of inspection, dimensions, testing, and identification of porcelain enameled formed steel plumbing fixtures, such as bathtubs, sinks, and lavatories, which are in general use and demand.

1.3 Reference Standards

The following standards are referenced in this document. Unless otherwise specified, the latest edition of each standard shall apply.

ASTM C 282 Test Method for Acid Resistance of Porcelain Enamels (Citric Acid Spot Test)

ASTM C 286 Definitions of Terms Relating to Porcelain Enamel and Ceramic-Metal Systems

ASTM C 346 Test Method for 45-deg Specular Gloss of Ceramic Materials

ASTM C 448 Test Method for Abrasion Resistance of Porcelain Enamels

ASTM C 614 Test Method for Alkali Resistance of Porcelain Enamels

ASTM D 1186 Test Method for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base

ASTM E 1347 Test Method for Directional Reflectance Factor, 45-deg 0-deg, of Opaque Specimens by Broad-Band Filter Reflectometry

ASTM F 462 Consumer Safety Specification for Slip-Resistant Bathing Facilities

2 DEFINITIONS

Definitions applicable to this Standard are as follows.

bathing surface — the portion of the sump of a bathtub on which, by either common usage or design, a bather might step or stand while bathing or showering, and which is exclusive of ledges or rims

chipping — fracturing and breaking away of fragments of a porcelain enamel surface

cracking — a defect in the porcelain enamel consisting of fractures or separations

craze — a defect appearing as one or more fine cracks in the porcelain enamel

dimple — a shallow depression in porcelain enamel, sometimes a defect

inspection window — an opening 3 in. (76 mm) in diameter cut from a small sheet of any flexible material, such as rubber or paper, for convenience in sliding over irregular surfaces to determine compliance with blemish requirements

lump — a rounded projection in the enamel surface

pinhole — a defect caused by gas evolution, characterized by a small hole resembling a pin prick that extends to the base metal

porcelain enamel — a substantially vitreous or glossy inorganic coating which is bonded to metal by fusion at a temperature above 800°F (427°C). (See ASTM C 286.)

sheet steel — for the purposes of this Standard, sheet steel shall be any steel which can be satisfactorily porcelain enameled to meet the requirements of this Standard, including:

(*a*) special purpose enameling iron or steel of low metalloid and copper content, especially manufactured and processed for the production of porcelain enameled units; or

(*b*) special type steels designed for special porcelain enamel application; or

(*c*) cold-rolled sheets.

span — the greatest length measured within the inner edges of the sump opening when the fixture is viewed from the position of the user. In the case of double

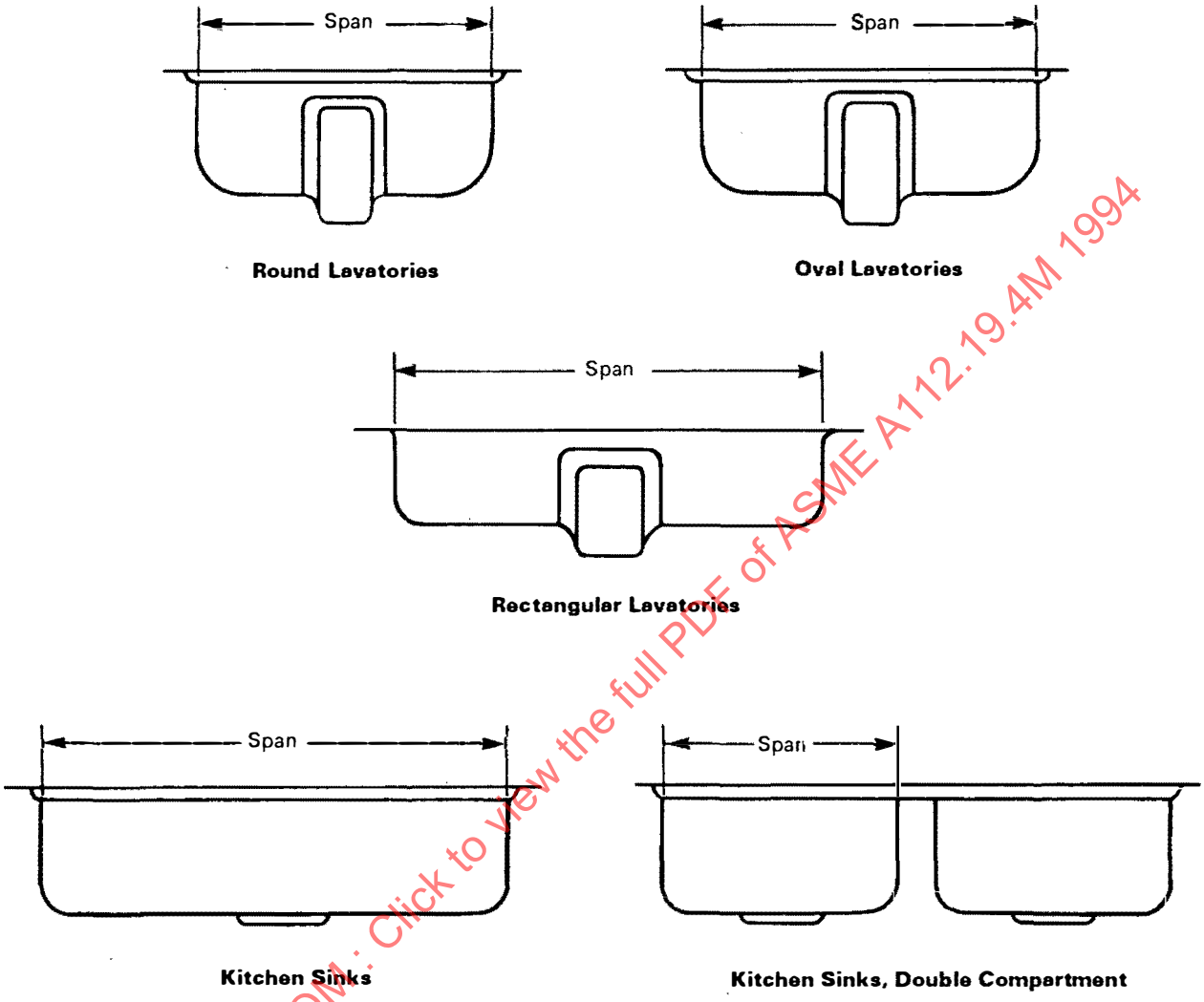


FIG. 1 LOCATIONS OF SPAN MEASUREMENTS

compartment sinks, that span is applicable to each of the bowls (see Fig. 1).

specks — particles of foreign matter that produce a contrasting color area on the surface

sump — the portion of the bathtub, lavatory, or sink intended for the collection of water, as limited by the rim

waviness — the appearance of irregular surface of the porcelain enamel

3 REQUIREMENTS

3.1 Materials

The fixtures shall be made from sheet steel and coated with porcelain enamel in accordance with the requirements of paras. 3.2 and 3.3. Alternate materials may be used for lavatory overflows.

3.2 Sheet Steel

3.2.1 Thickness. The thickness of the sheet prior to forming shall be 0.065 in. (1.65 mm) minimum when used for bathtub sumps; 0.054 in. (1.37 mm) or heavier when used for sinks and lavatories with a span of 30 in. (762.00 mm) or greater; and 0.043 in. (1.09 mm) or heavier when used for sinks and lavatories with a span of less than 30 in. (762.00 mm). Detached steel bathtub aprons shall be 0.043 in. (1.09 mm) or heavier.

TABLE 1 ALLOWABLE BLEMISHES

Blemish	Size	Maximum Number Per Fixture: Max. Number Per Inspection Window [Note (1)]	Rim, Bottom, Apron, and Back Wall	End Walls	Inside Wall
Specks	Small — 1/100 in. to 1/64 in. (0.25 mm to 0.40 mm)	2	[Note (2)]	[Note (2)]	[Note (2)]
	Medium — over 1/64 in. to 1/32 in. (over 0.40 mm to 0.80 mm)	1	4	6	8
	Large — over 1/32 in. to 1/16 in. (over 0.80 mm to 1.59 mm)	1	1	2	3
Dimples	...	1	4	6	8
Lumps	...	1	4	6	8

NOTES:
(1) Diameter — 3 in. (76.20 mm).
(2) Shall not be counted.

The thicknesses of steel indicated shall be those that are expected to produce a plumbing fixture conforming with the structural tests specified in para. 5.2. However, plumbing fixtures produced from thinner steel shall be considered satisfactory if they meet the structural requirements.

3.3 Porcelain Enamel

3.3.1 Thickness. A porcelain enamel coating shall be applied to all surfaces. The total thickness of the porcelain that is normally visible after installation shall be not less than 0.005 in. (0.13 mm), measured in accordance with para. 5.1.1.

3.3.2 Appearance. The porcelain enameled surface visible after installation shall be free from imperfections that adversely affect the appearance or serviceability of the fixture, except that certain minor blemishes (see Table 1) shall be permitted as provided under the method of inspection described in para. 5.1.2.

3.3.3 Color, Specular Gloss, and Reflectance. The fixture, when installed, shall be of uniform color. The porcelain enamel surface visible after installation shall be glossy to the extent that it will have a specular gloss of not less than 45 deg (0.79 radians) when tested in accordance with para. 5.1.3. If white, the reflectance of the cover coat shall be not less than 72% when determined in accordance with para. 5.1.4. Finishes for slip resistance or decorative treatments shall not be required to meet the gloss or reflectance standards.

3.3.4 Chemical Resistance. The porcelain enamel surface visible after installation shall be acid resistant so as to have a rating of not less than "A" when tested in accordance with para. 5.1.5. Also, the weight loss shall not exceed 20 mg/sq in. (0.031 kg/m^2, 0.07055 oz/sq in.), when tested in accordance with para. 5.1.6 for alkali resistance.

3.3.5 Abrasion Resistance. The surface abrasion index of the porcelain enamel surface visible after installation shall be 40 or higher when tested by the procedure given in para. 5.1.7.

3.3.6 Slip Resistance. If a slip-resisting product is furnished or specified, the bathing surface shall comply with the requirements of ASTM F 462 starting 1 in. in from all radii centerlines. See Fig. 2.

3.4 Structural Requirements

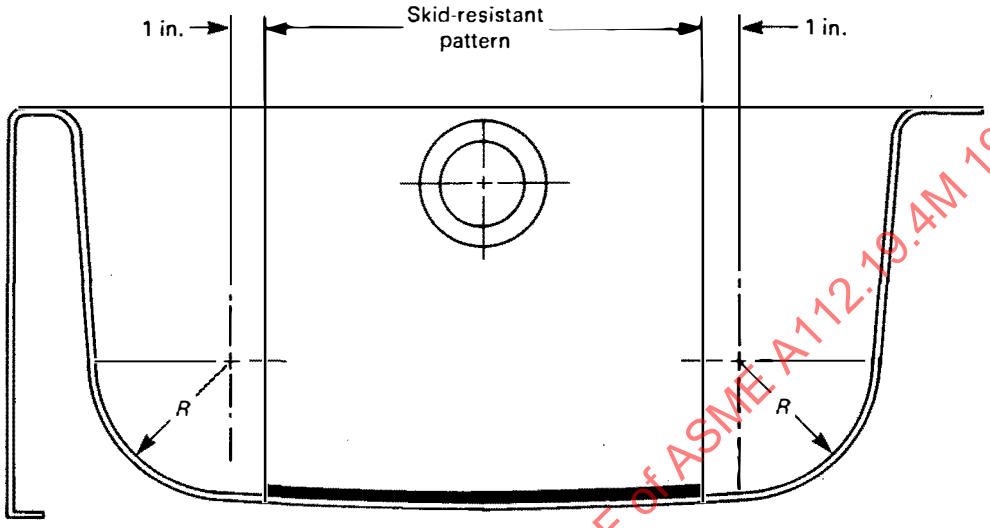
3.4.1 Warpage. Warpage of the surface of fixtures that contact adjoining surfaces, such as walls, floor cabinets, or countertops, shall not exceed 0.063 in./ft (5.25 mm/m) when tested in accordance with the method described in para. 5.2.1. Warpage of all other surfaces shall not exceed 0.094 in./ft (7.83 mm/m) when tested by the same method. Surfaces that are curved by design shall be excluded from these requirements.

3.4.2 Rigidity. Fixtures and furnished supports shall exhibit no more than the allowable permanent deformation, and the porcelain enamel shall not crack or chip when tested by the procedure given in para. 5.2.2.

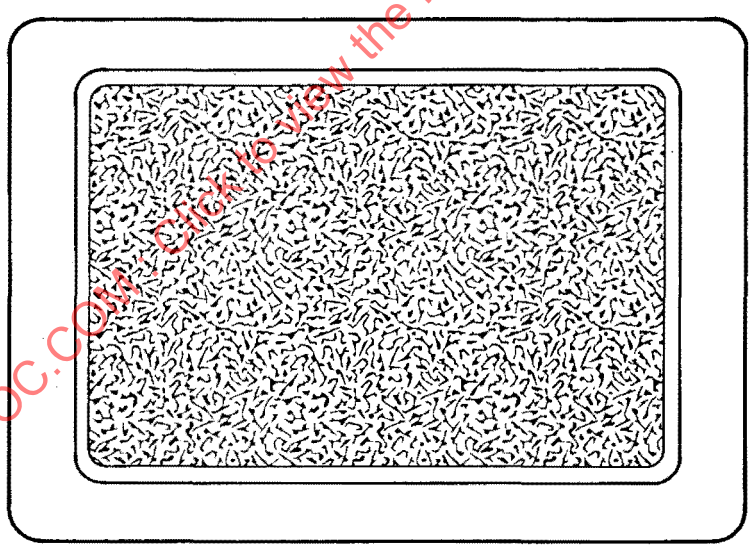
3.4.3 Draining. The pitch of the bottom of the bathtub toward the drain shall be not less than 1/4 in./ft (20 mm/m) and not more than 7/16 in./ft (35 mm/m). Sinks and lavatories shall be constructed so that they drain.

3.5 Types and Sizes

The fixture types and sizes described in Section 4

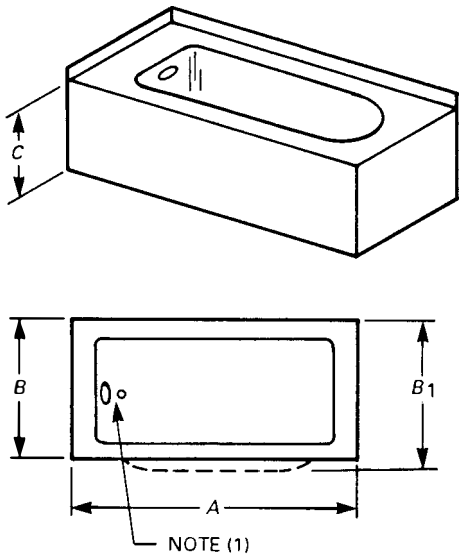


Elevation view



Plan view

FIG. 2 LOCATION OF SLIP-RESISTING SURFACES

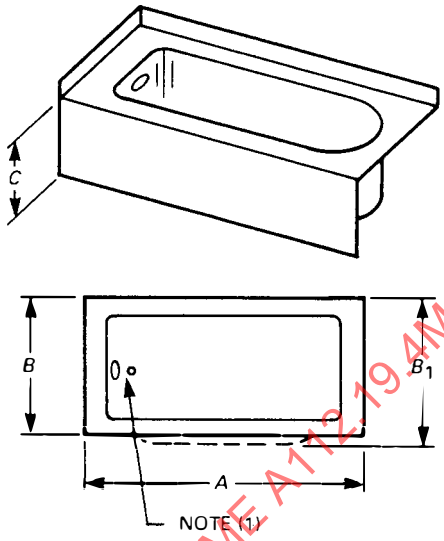


Sizes, ft (mm)	Dimensions, in. (mm)		
A	B	B_1 [Note (2)]	C
4½ (1372)	30 (762)	32 (813)	14–18 (356–457)

GENERAL NOTE: Design of bathtubs is at option of manufacturer within limits of requirements given herein.

NOTES:
(1) See Figs. 6 and 7 for outlet and overflow details.
(2) Front of bathtubs may be straight or extended; dimension B_1 applies only to bathtubs with extended front.

FIG. 3 CORNER BATHTUBS, RIGHT OR LEFT



Sizes, ft (mm)	Dimensions, in. (mm)		
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4½ (1372)	30 (762)	32 (813)	14–18 (356–457)

GENERAL NOTE: Design of bathtubs is at option of manufacturer within limits of requirements given herein.

NOTES:
(1) See Figs. 6 and 7 for outlet and overflow details.
(2) Front of bathtubs may be straight or extended; dimension B_1 applies only to bathtubs with extended front.

FIG. 4 RECESS BATHTUBS, RIGHT OR LEFT

are commonly used and are such as should provide representative selection for ordinary application. While it is considered that the use of such fixture types and sizes, where feasible, will be beneficial through simplification of production practices and in facilitating identification by the consumer, other types or sizes may be provided.

3.6 Dimensions and Tolerances

Where not otherwise specified, a tolerance of ±⅛ in. (±3 mm) shall apply to the dimensions in Section 4 and also to other dimensions given by the manufacturer. For the testing procedures in Section 5, a tolerance of 1% shall apply.

4 FIXTURE TYPES AND SIZES

4.1 Bathtubs

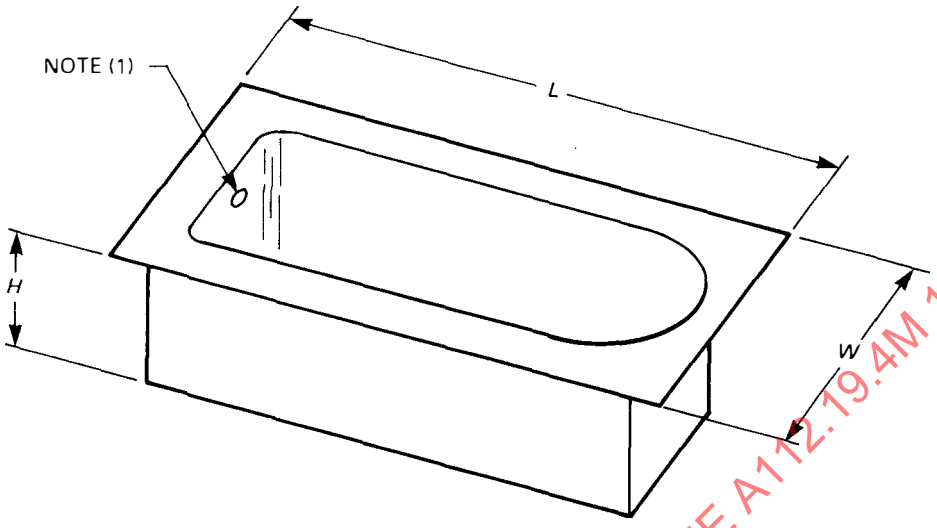
4.1.1 Common Types and Sizes

(*a*) Corner bathtubs with concealed end, with right or left overflow and drain, and with straight or extended front, shall have a minimum length of 4½ ft (1.4 m) and a minimum width of 30 in. (762 mm). The height shall be 14 in. to 18 in. (356 mm to 457 mm). (See Fig. 3.)

(*b*) Recess bathtubs, with right or left overflow and drain, shall have a minimum length of 4½ ft (1.4 m) and a minimum width of 30 in. (762 mm). The height shall be 14 in. to 18 in. (356 mm to 457 mm). (See Fig. 4.) Recess tubs shall have a watertight tiling flange.

(*c*) Drop-in bathtubs, with right or left overflow and drain, shall have a minimum length of 4½ ft (1.4 m) and a minimum width of 30 in. (762 mm). The height shall be not less than 14 in. (356 mm). (See Fig. 5.) Overall dimensions shall be at the discretion of the manufacturer.

4.1.2 Bathtub Overflows. The standard dimensions for the finished bathtub overflows shall be as shown in Figs. 6 and 7.



Sizes, ft (m)	Dimensions, in. (mm)	
L	*W*	*H*
4½, 5 (1.4, 1.5)	30 min. (762 min.)	14–18 (356–457)

GENERAL NOTE: Panel is optional with drop-in models.

NOTE:
(1) See Figs. 6 and 7 for outlet and overflow details.

FIG. 5 DROP-IN OR ISLAND TYPE BATHTUBS

4.1.3 Bathtub Outlets. The standard dimensions for all finished bathtub outlets shall be as shown in Fig. 6 detail.

4.1.4 Flanges and Tiling Beads. Bathtubs intended for installation against a vertical surface (wall) shall incorporate a continuously raised flange or bead not less than 5/16 in. (8 mm) above the rim at any point. The raised flange may be:

(*a*) integral with the bathtub;

(*b*) added to an island tub in the factory; or

(*c*) field installed using an optional installation kit. Each kit shall include installation instructions and all necessary parts and fasteners. The effectiveness of the moisture seal between the field-installed flange and the fixture shall be tested in accordance with para. 5.3.

4.2 Lavatories

4.2.1 Common Types and Sizes

(*a*) Round lavatories shall be 18 in. to 19 in. (457 mm to 483 mm) in outside diameter. See Fig. 8.

(*b*) Oval lavatories shall be 19 in to 20 in. (483 mm to 508 mm) × 16 in. to 17 in. (406 mm to 432 mm). See Fig. 9.

(*c*) Rectangular lavatories, flat rim with ledge, shall be 19 in. × 16 in. (483 mm × 406 mm) or 20 in. × 18 in. (508 mm × 457 mm). See Fig. 10.

(*d*) Rectangular self-rimming lavatories shall be 20 in. × 18 in. (508 mm × 457 mm). See Fig. 11.

(*e*) Round self-rimming lavatories shall be 18 in. to 19 in. (457 mm to 483 mm). See Fig. 12.

(*f*) Oval self-rimming lavatories shall be 20 in. × 17 in. (508 mm × 432 mm). See Fig. 13.

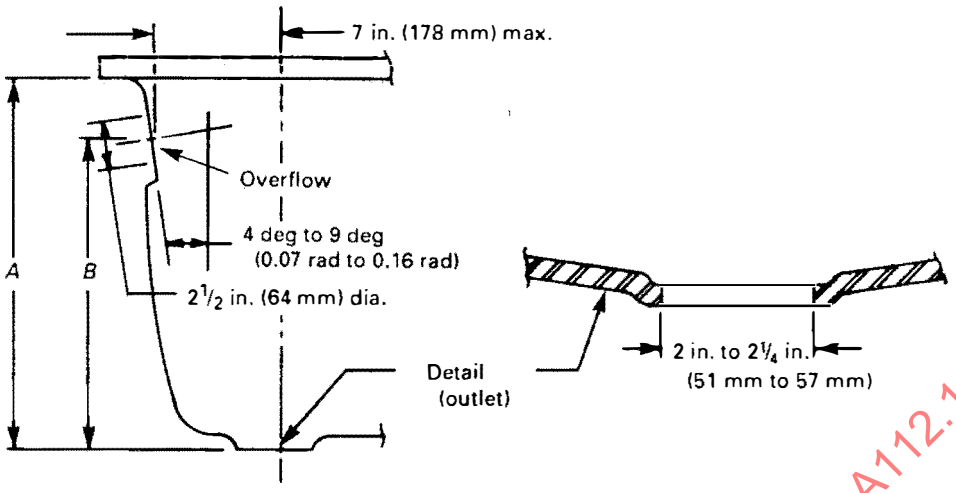
4.2.2 Lavatory Overflows (Optional). If lavatory overflows are furnished, the cross-sectional area shall not be less than 1 1/8 sq in. (725 mm^2). The location shall be determined by the manufacturer.

4.2.3 Lavatory Outlets. See Fig. 14.

4.3 Kitchen Sinks

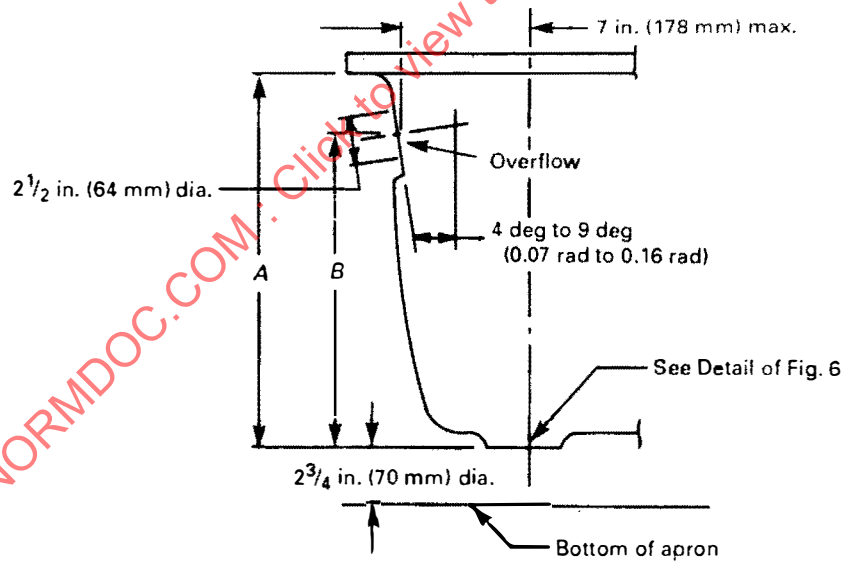
4.3.1 Common Types and Sizes

(*a*) Self-rimming and flat-rim kitchen sinks, single compartment, shall be 20 in. × 16 in. (508 mm × 406



	A		B	
	in.	mm	in.	mm
Bathtub Fixture (Fig. 4) Recess	13 min.	330 min.	10½ min.	266 min.

FIG. 6 BATHTUB OUTLET AND OVERFLOW DIMENSIONS



	A		B	
	in.	mm	in.	mm
Bathtub Fixture (Fig. 4) Recess	12½ min.	317 min.	9½ min.	241 min.

FIG. 7 BATHTUB OUTLET AND OVERFLOW DIMENSIONS FOR ABOVE-THE-FLOOR ROUGHING

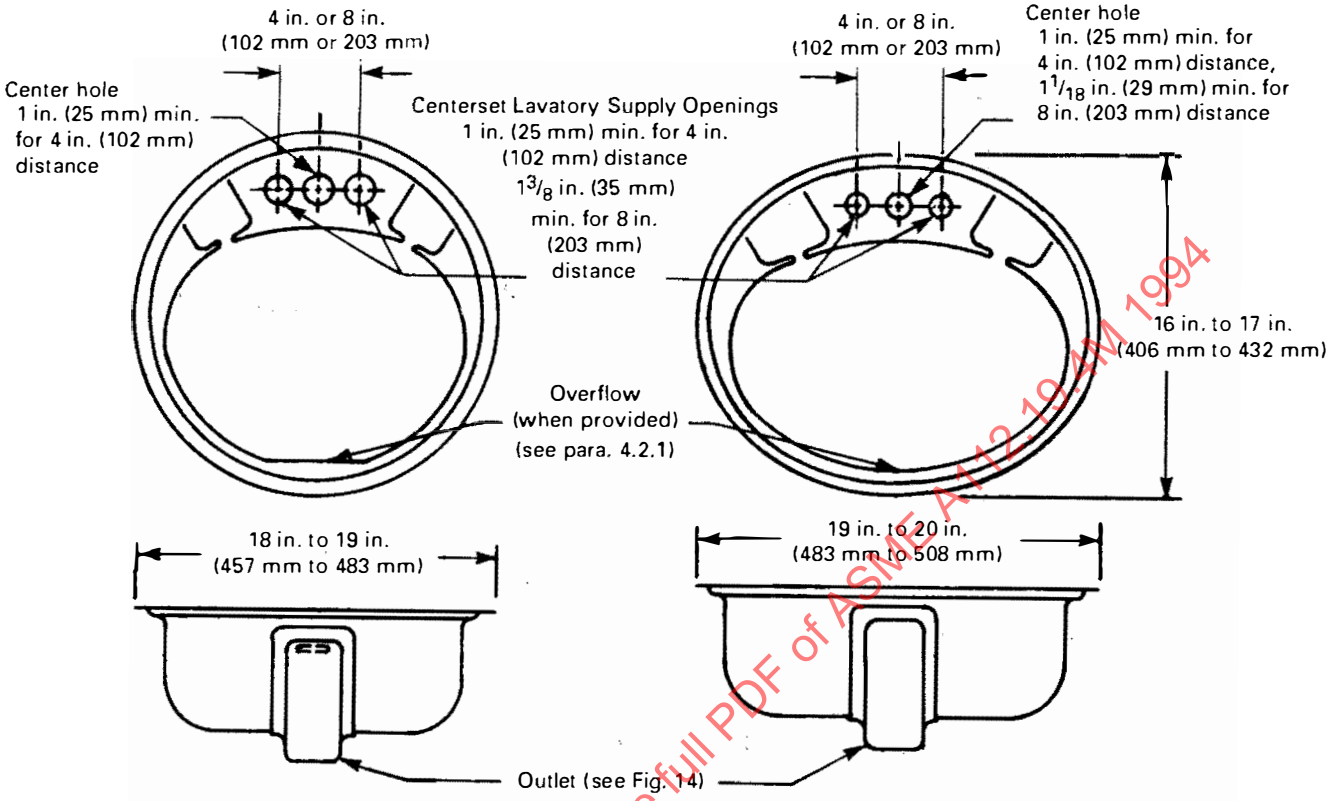
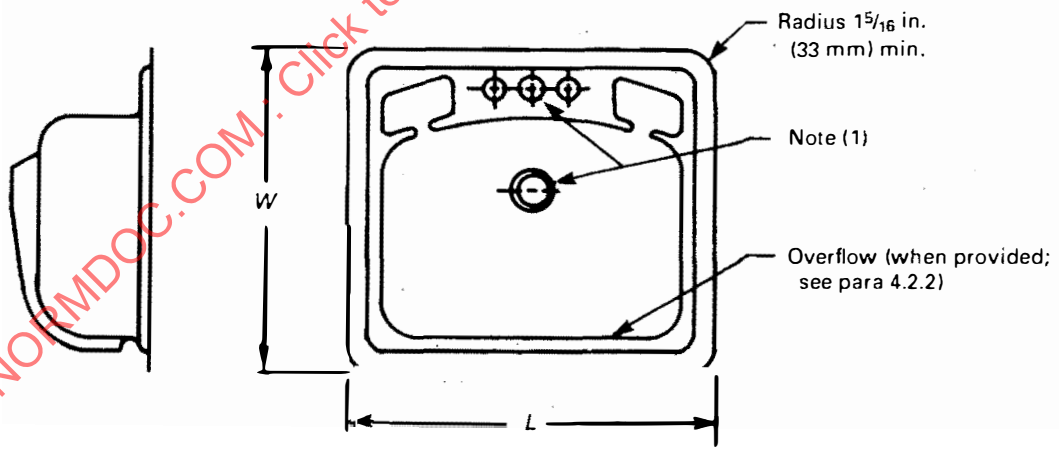


FIG. 8 ROUND LAVATORIES

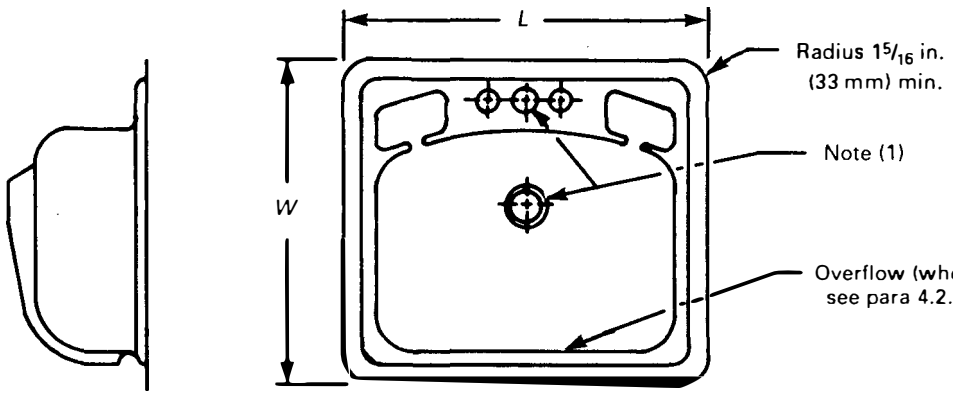
FIG. 9 OVAL LAVATORIES



Sizes, in. (mm)	
L	*W*
19 (483)	16 (406)
20 (508)	18 (457)

NOTE:
(1) See Fig. 8 for sizes of supply openings and Fig. 14 for outlet details.

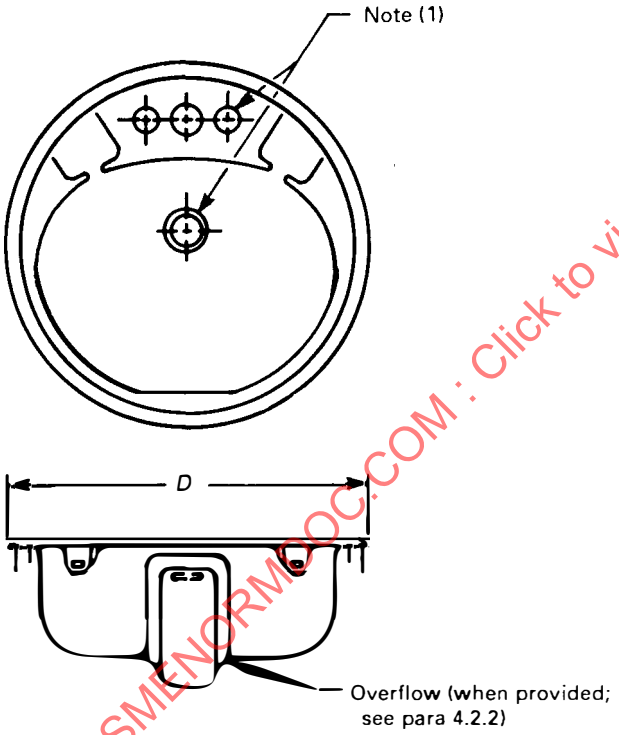
FIG. 10 FLAT-RIM LAVATORIES WITH LEDGE



Sizes, in. (mm)	
L	*W*
20 (508)	18 (457)

NOTE:
(1) See Fig. 8 for sizes of supply openings and Fig. 14 for outlet details.

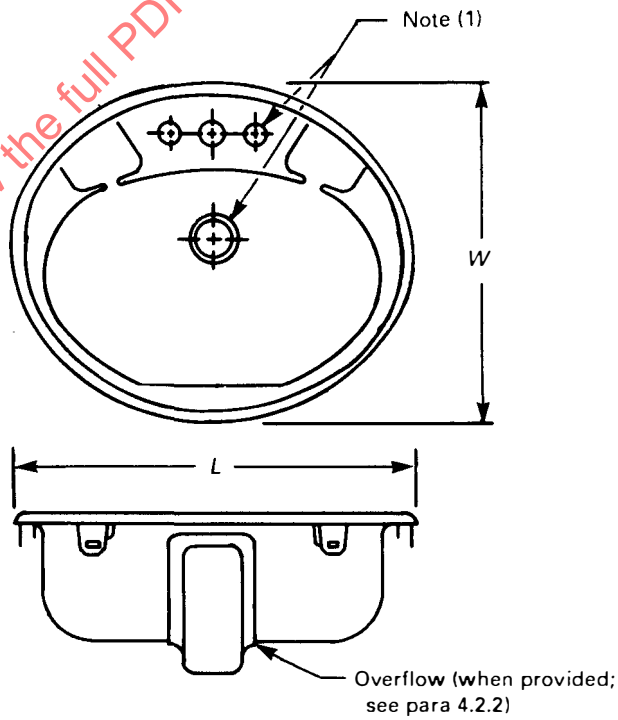
FIG. 11 RECTANGULAR SELF-RIMMING LAVATORIES



Sizes, in. (mm)
D
18–19 (457–483)

NOTE:
(1) See Fig. 8 for sizes of supply openings and Fig. 14 for outlet details.

FIG. 12 ROUND SELF-RIMMING LAVATORIES



Sizes, in. (mm)	
L	*W*
20 (508)	17 (432)

NOTE:
(1) See Fig. 8 for sizes of supply openings and Fig. 14 for outlet details.

FIG. 13 OVAL SELF-RIMMING LAVATORIES

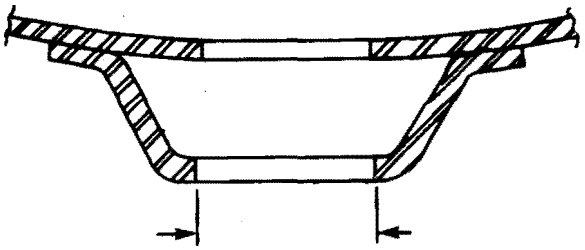
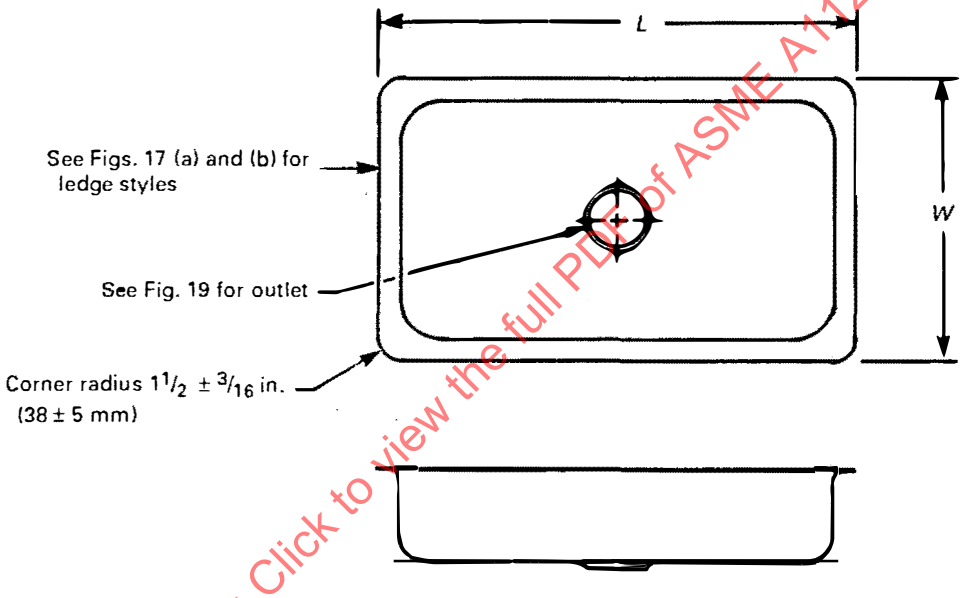


FIG. 14 LAVATORY DRAIN OUTLETS WITH OVERFLOW



Sizes, in. (mm)	
L	*W*
20 (508)	16 (406)
24 (610)	18 (457)

FIG. 15 SELF-RIMMING AND FLAT-RIM KITCHEN SINKS

mm) or 24 in. × 18 in. (610 mm × 457 mm). See Fig. 15.

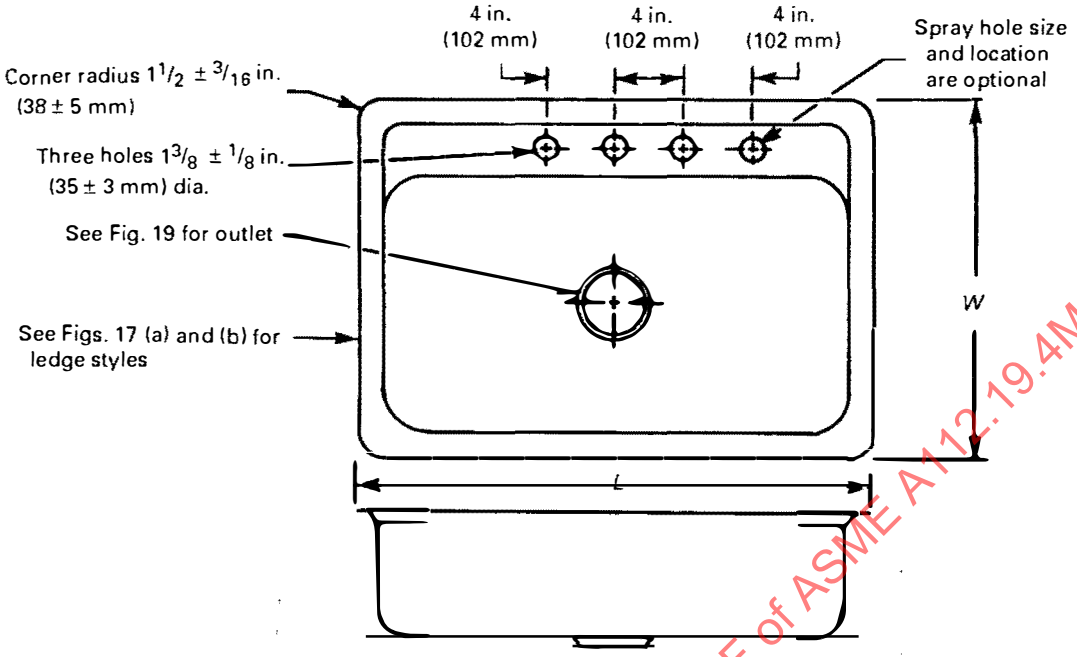
(*b*) Self-rimming and flat-rim kitchen sinks with ledge, single compartment, shall be 30 in. × 20 in. or 21 in. (762 mm × 508 mm or 533 mm) or 24 in. × 20 in. or 21 in. (610 mm × 508 mm or 533 mm). See Fig. 16.

(*c*) Self-rimming and flat-rim kitchen sinks, double compartment with ledge, shall be 32 in. × 20 in. or 21 in. (813 mm × 508 mm or 533 mm). See Fig. 17.

(*d*) Self-rimming and flat-rim kitchen sinks, double compartment, reversible, shall be 32 in. × 16 in. (813 mm × 406 mm). See Fig. 18.

4.3.2 Kitchen Sink Outlets. See Fig. 19.

4.3.3 Depth of Sinks. Sink compartment shall be 5 in. to 8 in. (127 mm to 203 mm) in depth. The depth of a sink shall be taken as the maximum depth of water that can be contained in a single sink com-



Sizes, in. (mm)	
L	*W*
30 (762)	20–21 (508–533)
24 (610)	20–21 (508–533)

FIG. 16 SELF-RIMMING AND FLAT-RIM LEDGE KITCHEN SINKS

partment, measured without benefit of the outlet depression.

5 METHODS OF INSPECTION AND TESTING

5.1 Porcelain Enamel

5.1.1 Thickness. Thickness of the coating shall be determined in accordance with ASTM D 1186.

5.1.2 Surface Inspection for Blemishes. The fixture shall be examined with the eyes of the observer about 2 ft (0.6 m) from the surface observed. The light source shall be partially diffused daylight, or substantially equivalent artificial light with an illumination level on the inspection surface of not less than 100 footcandles (1076 lux) nor greater than 200 footcandles (2152 lux). No actual count or measure of blemishes shall be attempted except in case of doubt since, with practice, dimensional limits and numbers can readily be gaged by the eye. Some waviness in an enamel surface is unavoidable and shall not be cause for rejection. Other imperfections shall be limited to the allowable blemishes listed in Table 1 (see para. 3.3.3 and Section 2 for definitions).

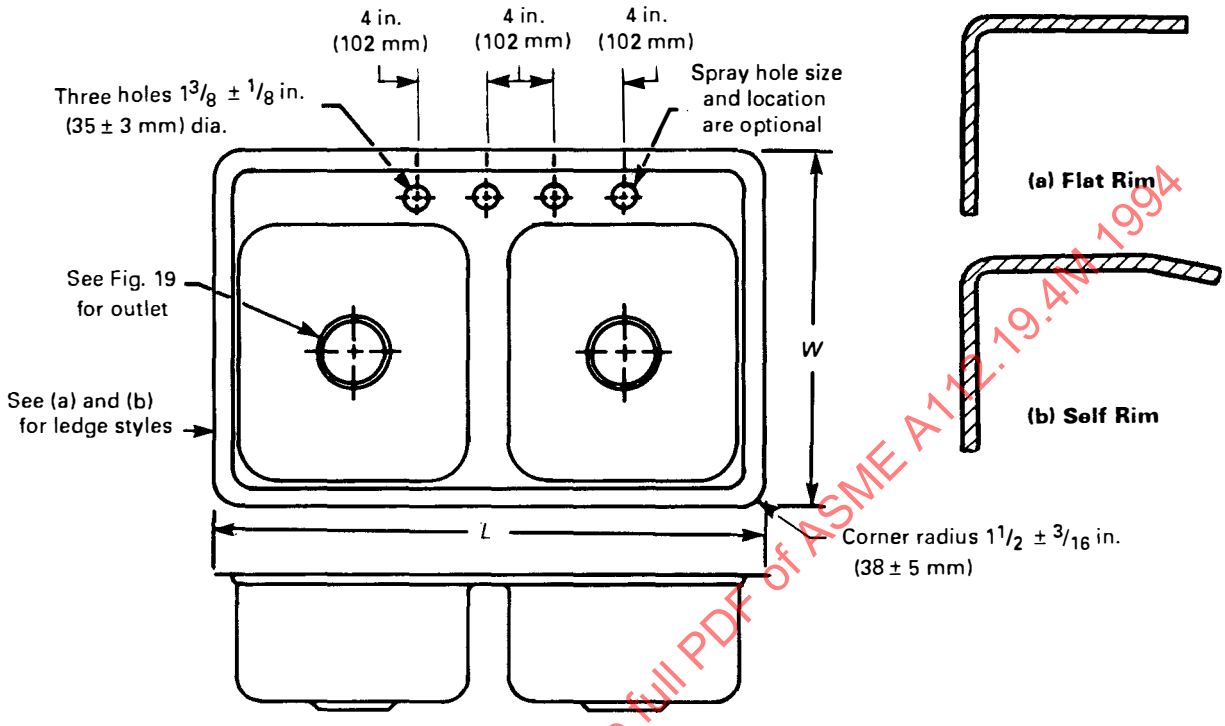
5.1.3 Specular Gloss. The specular gloss shall be determined in accordance with ASTM C 346.

5.1.4 Reflectance. White porcelain enameled fixtures shall be tested in accordance with ASTM E 1347.

5.1.5 Acid Resistance. Acid-resisting porcelain enamel shall be tested in accordance with the standard procedure described in ASTM C 282.

5.1.6 Alkali Resistance. Alkali resistance shall be determined by testing in accordance with ASTM C 614.

5.1.7 Abrasion Resistance. Surface abrasion index shall be determined by testing in accordance with ASTM C 448.



Sizes, in. (mm)	
L	*W*
32 (813)	20–21 (508–533)

FIG. 17 SELF-RIMMING AND FLAT-RIM LEDGE KITCHEN SINKS, DOUBLE COMPARTMENT

5.2 Structural Tests

5.2.1 Warpage Test. The fixture surface to be tested shall be placed on, or against, a flat testing surface. If a feeler gage of thickness equal to the total allowable warpage will not slide between the fixture surface and the testing surface without forcing, the fixture shall be deemed as satisfactorily within the warpage limitation. If the fixture surface does not contact the testing surface at all corners, the tolerance shall be determined by placing one feeler gage of the total warpage allowed under a corner which does not make contact with the testing surface, then forcing the fixture against this gage. If a second feeler gage of the same thickness will not slide between the fixture surface and testing surface at any other point, then the fixture shall be deemed as not warped by more than the specified amount allowable under the provisions of para. 3.4.1.

5.2.2 Rigidity Tests

5.2.2.1 Bathtubs

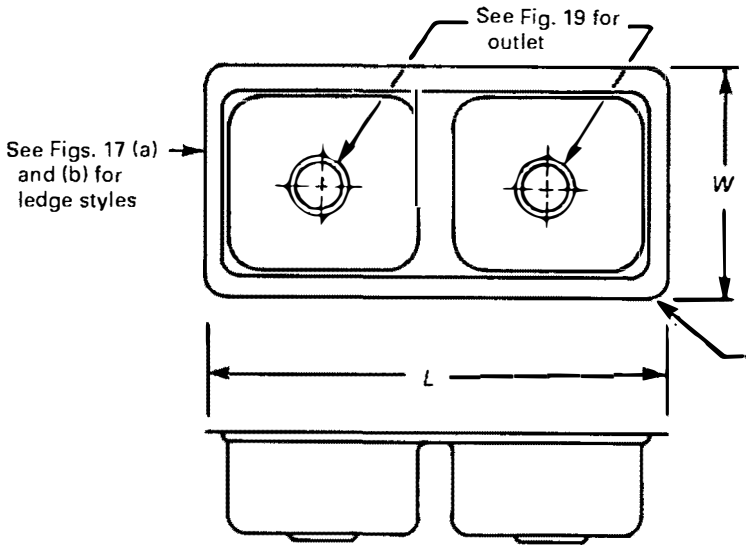
(*a*) *Apparatus.* Apparatus for rigidity test of bathtub specimens shall be as follows:

(*1*) three micrometer dial gages graduated to 0.001 in. (0.03 mm);

(*2*) a loading device for applying a 300-lb (136-kg) test load without shock to the center of the tub bottom;

NOTE: Either calibrated weights or a suitable mechanical or hydraulic load applicator may be used.

(*3*) A distribution pad to distribute the load over a 50 sq in. (32,300 mm^2) area, represented by a 5 in. × 10 in. (127 mm × 254 mm) rectangle shall be used. The pad shall consist of a sheet of ¾ in. (19 mm) thick sponge rubber (shore "A" durometer of 8 to 14) topped with a plate of plywood or stiffer material having a minimum thickness of ¾ in. (19 mm). This



Sizes, in. (mm)	
L	W
32 (813)	16 (406)

FIG. 18 SELF-RIMMING AND FLAT-RIM KITCHEN SINKS, REVERSIBLE

FIG. 19 KITCHEN SINK OUTLET DIMENSIONS

plate shall be of such thickness that there is no more than 0.01 in. (0.25 mm) deflection of the ends when the 300-lb (136-kg) load is applied during test.

(*b*) *Support*

(*1*) The bathtub shall be mounted for test in a wood frame simulating normal installation. Design of the supporting frame shall be such as to allow for clearance under the tub for deflection measuring dial gages. The manufacturer's installation instructions, when obtainable, shall be used in spacing the 2 in. × 4 in. (51 mm × 102 mm) stud of the frame and in fastening the tub to the frame. In lieu of explicit manufacturer's instructions, the tub shall be fastened along the water bead to each stud of the test fame by 1½ in. (38 mm) long number 6 steel wood screws using ⅜ in. (10 mm) steel washers. The spacing of the studs in the supporting frame shall be no greater than 16 in. (406 mm) on centers.

(*2*) The top of the supporting frame shall be at least 12 in. (305 mm) higher than the top of the installed tub.

(*3*) If legs or other component parts of the tub are within ⅛ in. (3 mm) of the floor line after installation, rigid vertical support shall be provided for these components.

(*4*) The front apron shall be supported in a continuous bed of plaster of Paris.

(*c*) *Procedure.* Maintain temperature of test area and fixture at 75°F ± 10°F (24°C ± 6°C).

(*1*) Before continuing with the test, inspect the finished surface of the tub for cracks and other defects. Note all defects and damage.

(*2*) Center the distribution pad over the hori-

zontal centerlines of the sump with the 10 in. (254 mm) dimension along the length of the sump. Determine the sump centerlines by using the average length and width of the sump.

(*3*) Place the three micrometer dial gages on a rigid base beneath the longitudinal centerline of the sump, with one directly beneath the center of the distribution pad and the other two within 2 in. (51 mm) of each end of the bottom of the sump.

NOTE: The areas where the tips of the dial gage bear on the tub shall be flat and smooth so that a small lateral movement of the tub will not change the gage reading by more than 0.001 in. (0.03 mm). These bearing areas shall be prepared either by grinding the undersurface or by rigidly fastening a small, flat, level plate to the tub. In case the drain hole of the bathtub should interfere with the placement of a gage, a standard drain-fitting spud shall be inserted in the drain outlet hole and a flat area on the spud used for the dial gage bearing.

(*4*) Preload the specimen by applying the test load of 300 lb (136 kg) on the center of the distribution pad and leaving the load in place for 5 minutes. Then remove the load and make the initial dial gage readings.

(*5*) Reload the tub and take the gage reading immediately following the load application and again 5 minutes later. Finally, remove the load, and take readings immediately following removal and again 10 minutes later.

(*6*) Determine the average settlement of the tub and supports by averaging the deflections measured by the two end gages. Determine the center deflection of the sump by subtracting this average settlement from the deflection measured by the center gage.

(*7*) After load removal, inspect the surface of the tub for cracks in accordance with para. 5.2.2.3. Note any other damage that develops from the testing.

(*d*) *Report*. Report the following information:

(*1*) specimen identification

(*2*) description of specimen including overall height, width, and length

(*3*) description of test frame

(*4*) method of supporting and fastening bathtub test frame

(*5*) defects, if any, prior to test

(*6*) defects, if any, after test

(*7*) deflection at the center of sump:

(*a*) immediately after application of load

(*b*) 5 minutes after application of load

(*c*) immediately after removal of load

(*d*) 10 minutes after removal of load

(*e*) *Requirement*. With inspection of the bathtub in accordance with para. 5.2.2.3, the bathtub shall show no damage to inner or outer surfaces as a result of testing. Damage to the inner surface means cracking, while damage to the outer surface means the occurrence of cracking or separation of reinforcing members. In addition, center deflection 5 minutes after load is applied shall not be greater than 0.125 in. (3.18 mm), nor shall residual center deflection 10 minutes after the load is removed be greater than 0.003 in. (0.08 mm).

5.2.2.2 Lavatories and Sinks

(*a*) *Apparatus*. Apparatus for rigidity test of lavatories and sinks shall be as follows:

(*1*) a loading device for applying a 100- or 200-lb (45- or 91-kg) test load without shock to the center of the fixture bottom shall be used. Either calibrated weights or a mechanical or hydraulic load applicator may be used.

(*2*) distribution pads

(*a*) For fixtures with a span of 30 in. (762 mm) or more, a pad to distribute the load over a 60 sq in. (39,150 mm^2) area, represented by a $7\frac{1}{2}$ in. × 8 in. (191 mm × 203 mm) rectangle shall be used. The pad shall consist of a sheet of sponge rubber $\frac{3}{4}$ in. (19 mm) thick (shore "A" durometer of 8 to 14), topped with a plate of plywood or stiffer material having a minimum thickness of $\frac{3}{4}$ in. (19 mm).

(*b*) For fixtures with a span of less than 30 in. (762 mm), a pad with the same characteristics as that for the 30 in. (762 mm) span fixture shall be used, except that the pad shall distribute the load over a 30 sq in. (19,500 mm^2) area represented by a 5 in. × 6 in. (127 mm × 152 mm) rectangle.

(*b*) *Support*. The lavatory or sink shall be mounted for test in a wood frame simulating normal installation.

(*c*) *Procedure*. Maintain the temperature of the test area and fixture at 75°F ± 10°F (24°C ± 6°C). Mount the fixture for test in a wood frame simulating normal installation.

(*1*) Before continuing the test, inspect the surfaces of the fixture. Note all defects and damage, and maintain air and specimen temperature at 75°F ± 10°F (24°C ± 6°C) during the course of the test.

(*2*) Center the distribution pad over the center of the fixture bottom.

(*3*) Preload the fixture as follows:

(*a*) for fixtures with a span of 30 in. (762 mm) or more, apply a test load of 200 lb (91 kg) at the center of the distribution pad;

(*b*) for fixtures with a span of less than 30 in. (762 mm), apply a test load of 100 lb (45 kg) at the center of the distribution pad;

(*c*) for double compartment sinks, test one bowl based on its span, in accordance with the re-