

ASME A112.6.3-2016

[Revision of ASME A112.6.3-2001 (R2007)]

Floor and Trench Drains

AN AMERICAN NATIONAL STANDARD



**The American Society of
Mechanical Engineers**

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Two Park Avenue • New York, NY • 10016 USA

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FOREWORD

The American National Standards Committee A112 was established on July 27, 1955 for the purpose of standardizing plumbing materials and equipment. Its first organizational meeting was held on July 22, 1958, and Panel No. 21 was created on May 1, 1964 to establish standards for roof drains, floor drains, backwater valves, and other drainage specialties. Its scope was the recommendation of suitable existing standards in cooperation with interested sponsors or the development of adequate new standards as needed for roof drains, floor drains, and other drains as used or installed in plumbing systems. The Committee has since been reorganized as an ASME Standards Committee.

The ASME A112 Committee was restructured in 1998 in accordance with the ASME Redesign Process, and Panel 21 Working Group 1 became Project Team 6.3. The Project Team met twice to update this Standard, which now includes criteria from the International Association of Plumbing and Mechanical Officials (IAPMO), PS 4 and PS 16.

This Standard was approved as an American National Standard on January 26, 2016.

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The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

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The request for an interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not “approve,” “certify,” “rate,” or “endorse” any item, construction, proprietary device, or activity.

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FLOOR AND TRENCH DRAINS

1 GENERAL

1.1 Scope

This Standard covers floor, area, adjustable floor, and trench drains that are used inside of, or outside and immediately adjacent to, building structures. This Standard specifies design requirements, definitions, nomenclature, outlet types and connections, grate-free areas, top-loading classifications, materials, and finishes. Seam-welded, socket-type, stainless steel fabricated drains are covered in ASME A112.3.1.

1.2 Alternatives

The requirements of this Standard are not intended to prevent the use of alternative designs, materials, or methods of construction, provided such alternatives meet the intent and requirements of this Standard.

1.3 Units of Measurement

The values stated in either SI (metric) or U.S. Customary (yard/pound) units of measure are equivalent in application; however, each system is to be used independently of the other. In this Standard, U.S. Customary units are shown in parentheses. Combining values from the two systems can result in nonconformance with the Standard.

1.4 Illustrations

The illustrations included in this Standard are intended only to describe and portray typical drains and are not intended to restrict design or to specify requirements.

1.5 Reference Standards

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

ASME A112.3.1, Stainless Steel Drainage Systems for Sanitary DWV, Storm, and Vacuum Applications, Above- and Below-Ground

ASME A112.18.1/CSA B125.1, Plumbing Supply Fittings
ASME B16.25, Buttwelding Ends

Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

ASTM A48, Standard Specification for Gray Iron Castings

ASTM A74, Standard Specification for Cast Iron Soil Pipe and Fittings

ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

ASTM A536, Standard Specification for Ductile Iron Castings

ASTM A563, Standard Specification for Carbon and Alloy Steel Nuts

ASTM A888, Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications

ASTM B584, Standard Specification for Copper Alloy Sand Castings for General Applications

ASTM C564, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings

ASTM C1440, Standard Specification for Thermoplastic Elastomeric (TPE) Gasket Materials for Drain, Waste, and Vent (DWV), Sewer, Sanitary and Storm Plumbing Systems

ASTM D1784, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

ASTM D2661, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings

ASTM D2665, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

ASTM D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

ASTM D3965, Standard Classification System and Basis for Specifications for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Materials for Pipe and Fittings

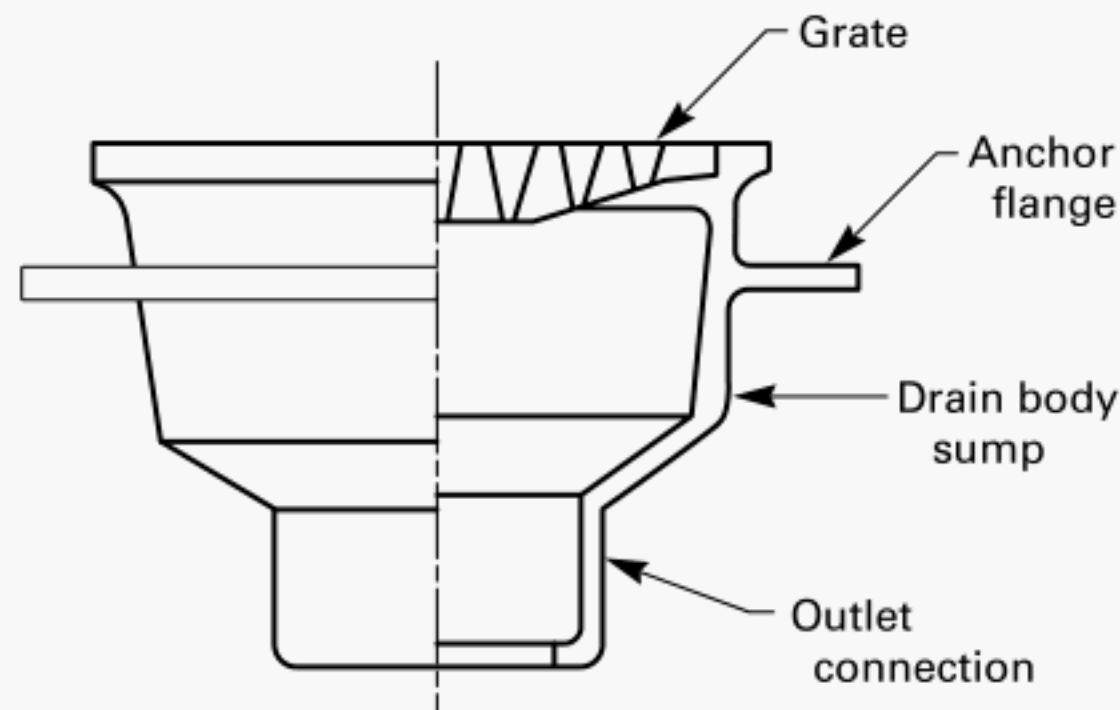
ASTM D4101, Standard Specification for Polypropylene Injection and Extrusion Materials

ASTM D4329, Standard Practice for Fluorescent Ultraviolet (UV) Lamp Apparatus Exposure of Plastics

ASTM G152, Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

ASTM G153, Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

Publisher: ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 (www.astm.org)

Fig. 1 Area Drain Nomenclature

CSA B602, Mechanical couplings for drain, waste, and vent pipe and sewer pipe

Publisher: CSA Group, 178 Rexdale Boulevard, Toronto, ON, M9W 1R3, Canada (www.csagroup.org)

1.6 Definitions

area, grate-free: total area of the drainage openings in the grate.

area, open: see *area, grate-free*.

blowhole: a hole in casting due to air or gas in the metal or mold.

cold shut: casting defects formed when two streams of metal become so cold that they do not fuse upon meeting, creating an incomplete casting.

drain, adjustable floor: a floor drain designed for use in finished floor areas with an adjustable strainer and grate and a seepage flange on the body.

drain, area: a receptor intended to receive and convey runoff water or other liquid from the areas immediately adjacent to the building structure to the drainage system (see Fig. 1).

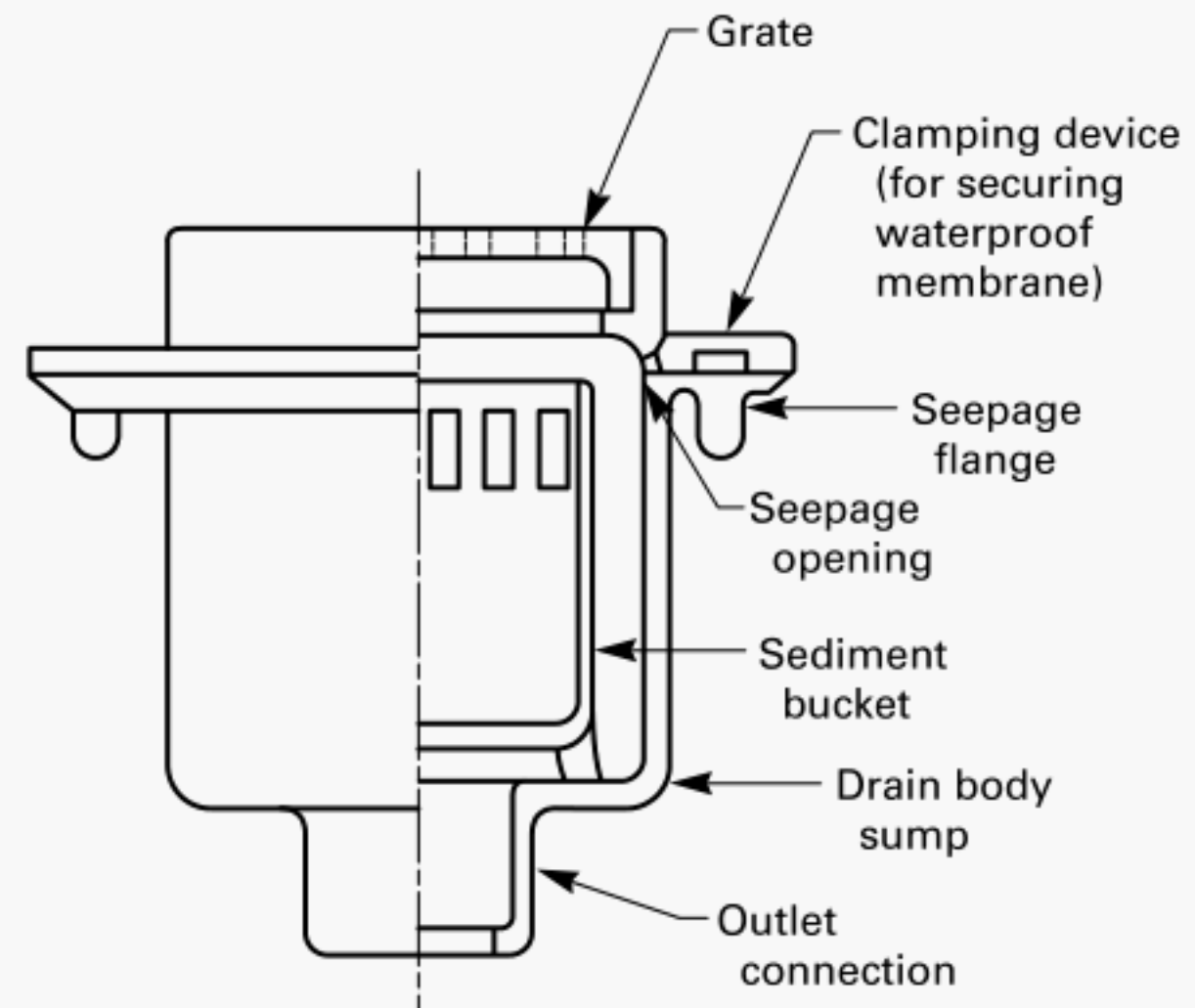
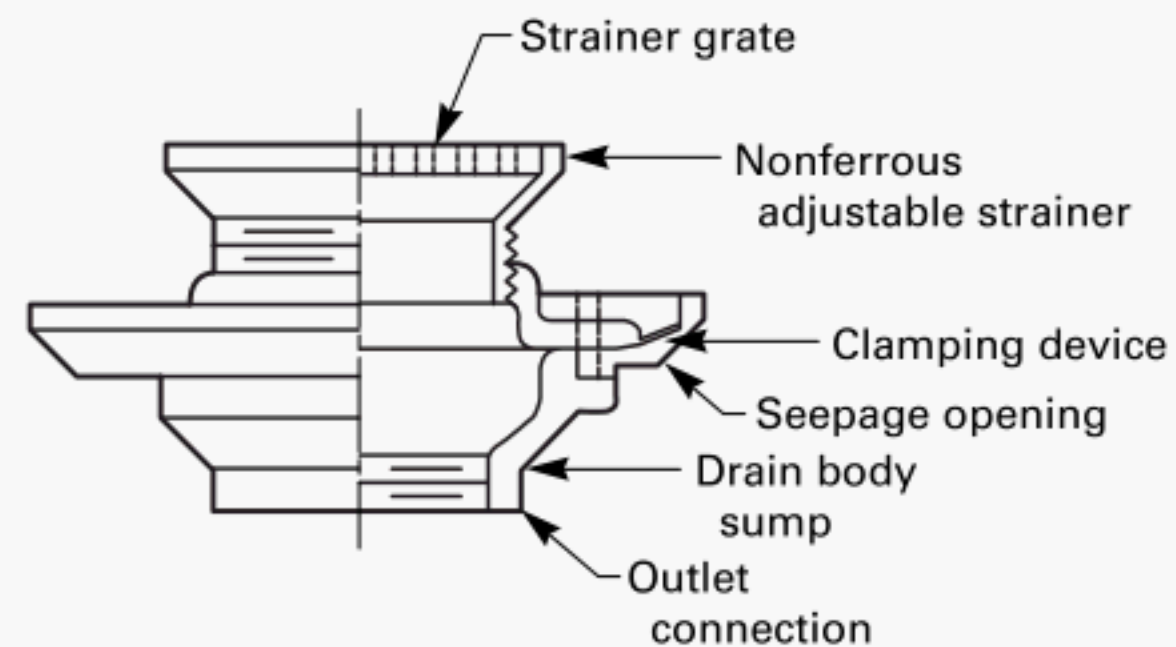
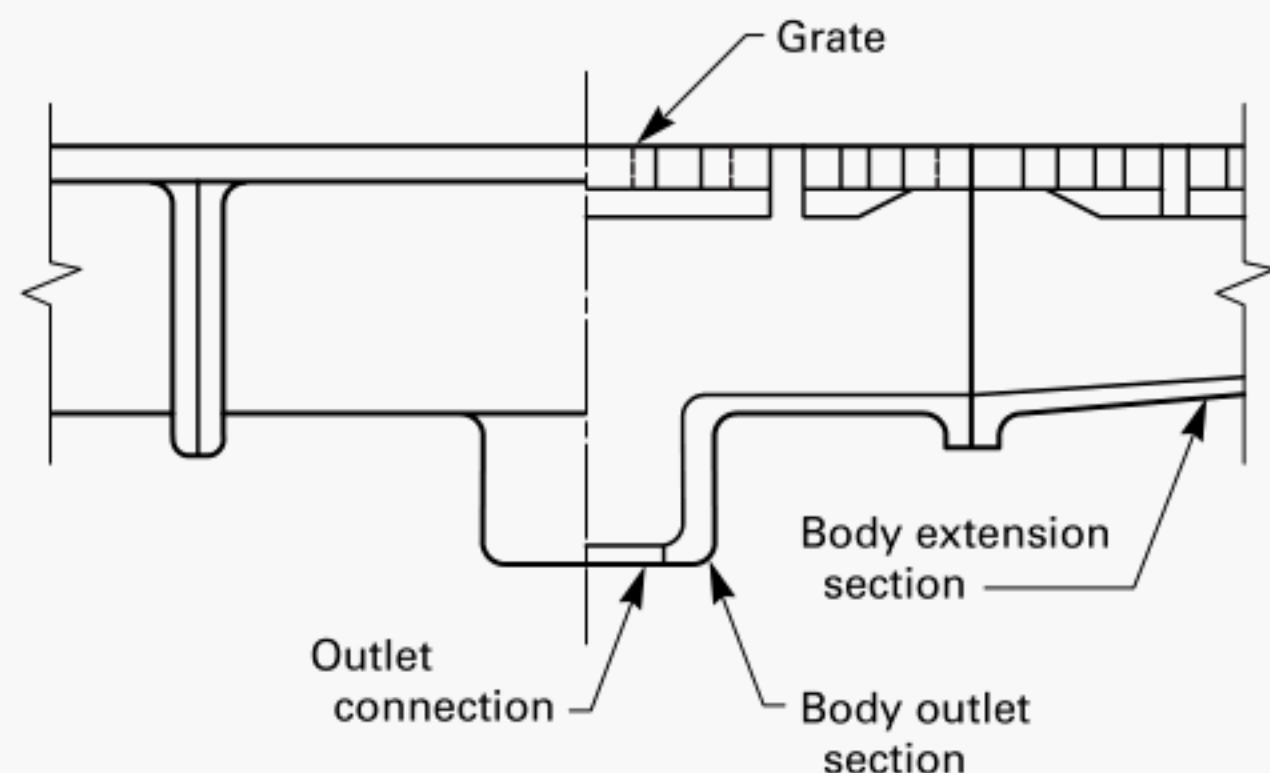
drain, floor: a receptor intended to receive and convey runoff water or other liquid from building floors to the drainage system (see Figs. 2 and 3).

drain, trench: a long, narrow receptor intended to receive and convey runoff water or other liquids to the drainage system (see Fig. 4).

fin: projection on castings due to imperfect joints.

heel-resistant grate: a grate designed to resist entry of high-heeled shoes.

weep hole: a perforation (opening) above the seepage (flashing) flange intended to receive leakage from around the drain and direct it into the sump.

Fig. 2 Floor Drain Nomenclature**Fig. 3 Adjustable Top Floor Drain Nomenclature****Fig. 4 Trench Drain Nomenclature**

2 GENERAL REQUIREMENTS

2.1 Materials

2.1.1 Castings. Castings shall be sound, free of blowholes, cold shuts, fins, and other imperfections, and shall be of uniform thickness and true to pattern.

2.1.2 Cast Iron. Cast iron shall comply with Class 25 specified in ASTM A48.

2.1.3 Ductile Iron. Ductile iron shall comply with or exceed the requirements of Grade 60-40-18, 60-42-10, 60-45-12, or 80-55-06 specified in ASTM A536.

2.1.4 Stainless Steel. Stainless steel alloys shall be Type 304, 316, or 316L.

2.1.5 Bronze. Bronze shall comply with the requirements for copper alloy No. C83600, C83800, or C84400 specified in ASTM B584.

2.1.6 Nickel-Bronze. Nickel-bronze shall comply with the requirements for copper alloys No. C97300, C97600, or C99700 specified in ASTM B584.

2.1.7 Acrylonitrile-Butadiene-Styrene. Acrylonitrile-butadiene-styrene (ABS) shall comply with or exceed the properties of cell classification 32222 specified in ASTM D3965.

2.1.8 Polyvinyl Chloride. Polyvinyl Chloride (PVC) shall comply with or exceed the properties of cell classification 12454 or 14333 specified in ASTM D1784.

2.1.9 Polyethylene. Polyethylene (PE) shall comply with ASTM D3350.

2.1.10 Polypropylene. Polypropylene (PP) shall comply with ASTM D4101.

2.1.11 Bolting Materials. Materials used for studs, nuts, cap screws, and other steel fasteners shall comply with or exceed the requirements of Grade A steel specified in ASTM A307 or ASTM A563.

2.2 Coatings

Coatings shall comply with the requirements specified in Clause 5.2 of ASME A112.18.1/CSA B125.1.

2.3 Weep Holes

Weep holes may be provided at the option of the manufacturer. When provided, weep hole(s) shall have a minimum combined (i.e., total) area of 24 mm² (0.037 in.²) and a smallest dimension of at least 3.2 mm (0.125 in.).

2.4 Drain Body Thickness

The minimum thickness for drain body sumps shall be 3.96 mm (0.156 in.).

2.5 Mating Surfaces

Drain bodies and clamping ring shall have smooth, mating surfaces to provide a watertight joint with membranes.

2.6 Caulking Areas

There shall be no obstructions in the drain caulking area.

2.7 Trap Primers

Floor drains may have a means of attaching a trap primer to it.

3 BOLTS AND FASTENERS

3.1 General

Bolts and fasteners used to connect clamp collars, frames, or drain flanges to the bodies of drains shall be at least 6.35 mm ($\frac{1}{4}$ in.) national coarse (NC).

3.2 Drains

Drains shall have at least three bolts.

3.3 Inserts for Fasteners

Inserts for fasteners in plastic drains shall be molded into the plastic material.

3.4 Threads

Threads shall be American national pipe taper (NPT) Classes 2A and 2B.

3.5 Tolerances

Tolerances on the dimensions specified in Tables 1, 2, and 3, and the associated figures shall be ± 1.6 mm (± 0.06 in.).

4 OUTLETS — TYPES AND CONNECTIONS

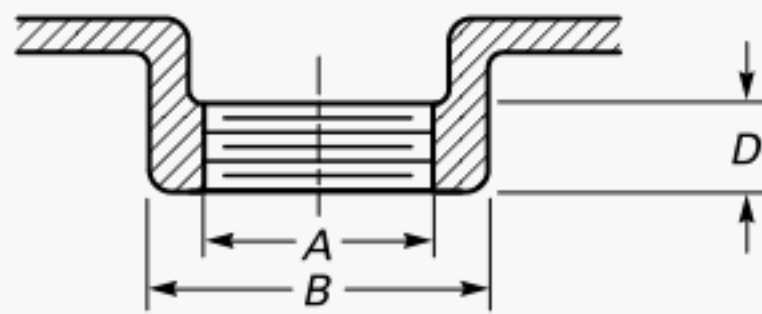
4.1 Outlet Centerlines

Bottom outlets shall have vertical centerlines. Side outlets and side outlets with integral traps shall have horizontal centerlines (see Figs. 5, 6, and 7).

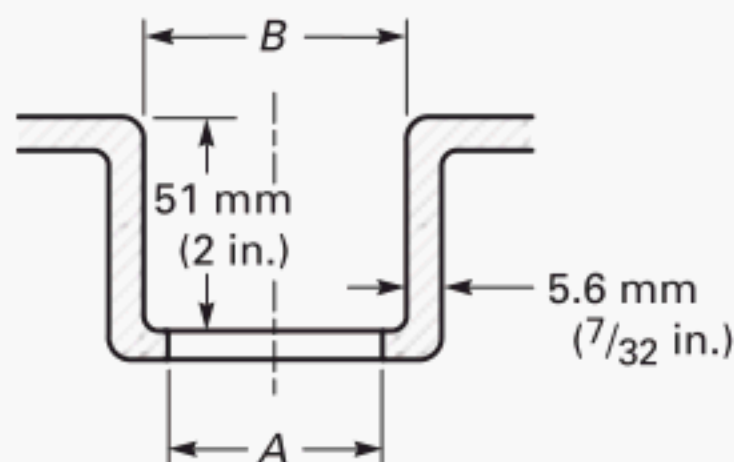
4.2 Outlet Connections

4.2.1 Connections for bottom outlets shall be threaded, inside caulk, spigot (no-hub), gasketed, butt-welded, or solvent-cement welded.

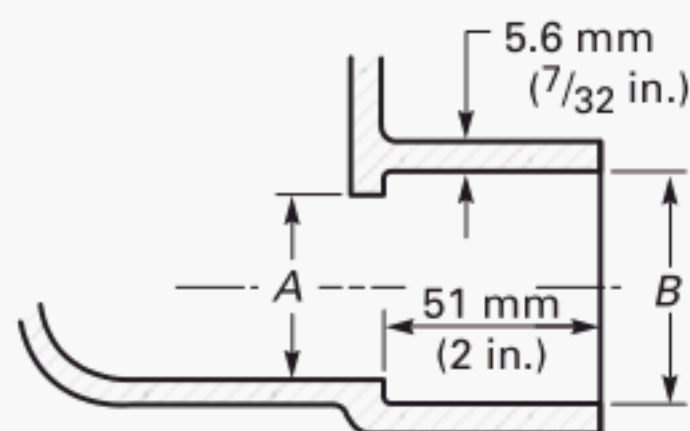
4.2.2 Connections for side outlets and side outlets with integral traps shall be threaded, hub (outside caulk), spigot (no-hub), gasketed, butt-welded, or solvent-cement welded.

Table 1 Minimum Dimensions for Threaded Outlet Connections

Nominal Size	NPT, A, in.	B		D	
		in.	mm	in.	mm
1½	1½	2⅝	59	7/16	11
2	2	2⅞	73	7/16	11
2½	2½	3⅜	86	5/8	16
3	3	4⅛	105	¾	19
4	4	5⅛	130	13/16	21
5	5	6¼	159	7/8	22
6	6	7¼	184	1	25

Table 2 Minimum Dimensions for Inside Caulk (Gasket) Outlet Connections

Nominal Size	A		B	
	in.	mm	in.	mm
2	2½	64	3	76
3	3⅝	92	4⅛	105
4	4⅝	117	5⅛	130
5	5⅝	143	6⅛	156
6	6⅝	168	7⅛	181

Table 3 Minimum Dimensions for Hubbed (Push-On) Outlet Connections

Nominal Size	A		B	
	in.	mm	in.	mm
2	2	51	3	76
3	3	76	4⅛	105
4	4	102	5⅛	130
5	5	127	6⅛	156
6	6	152	7⅛	181

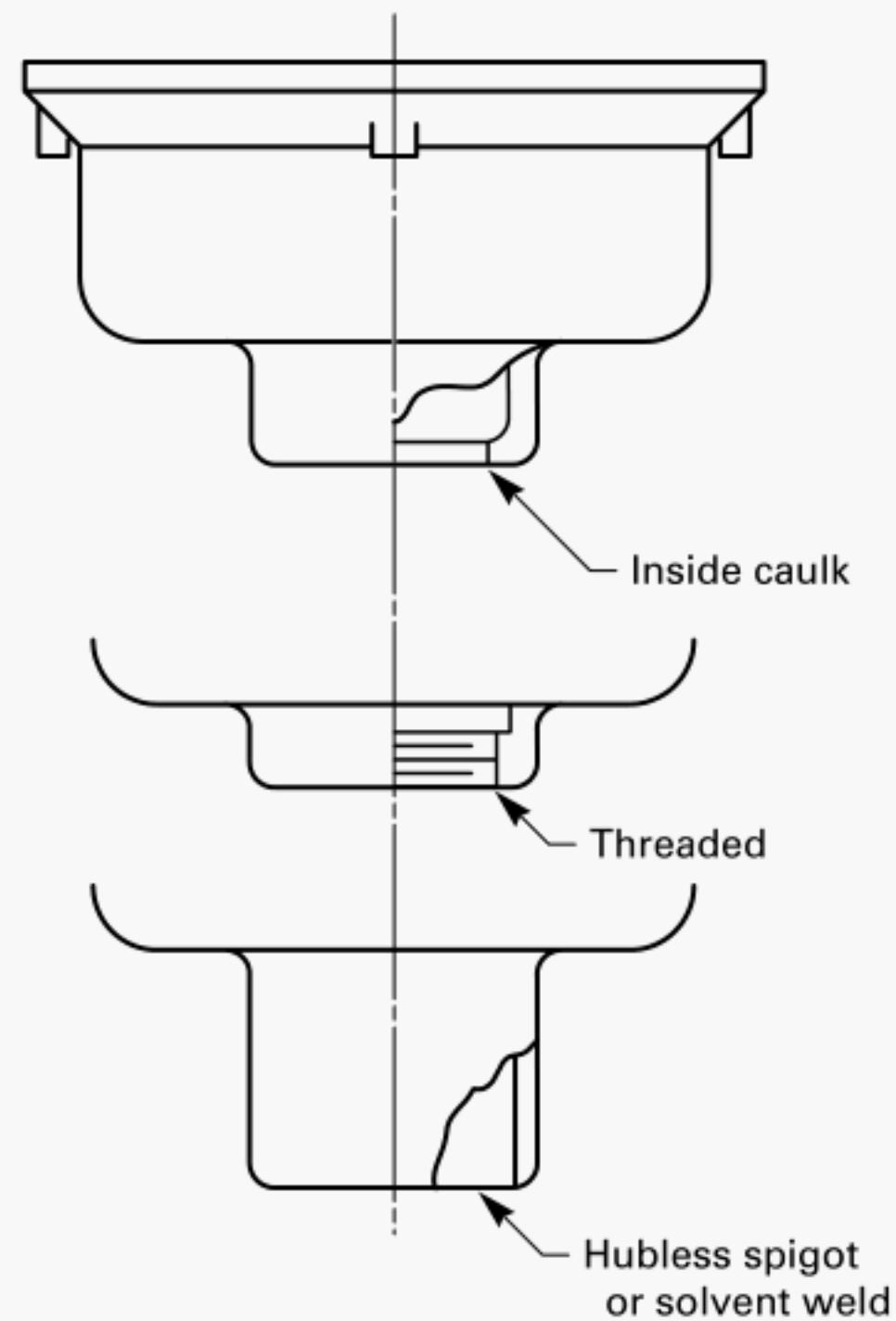
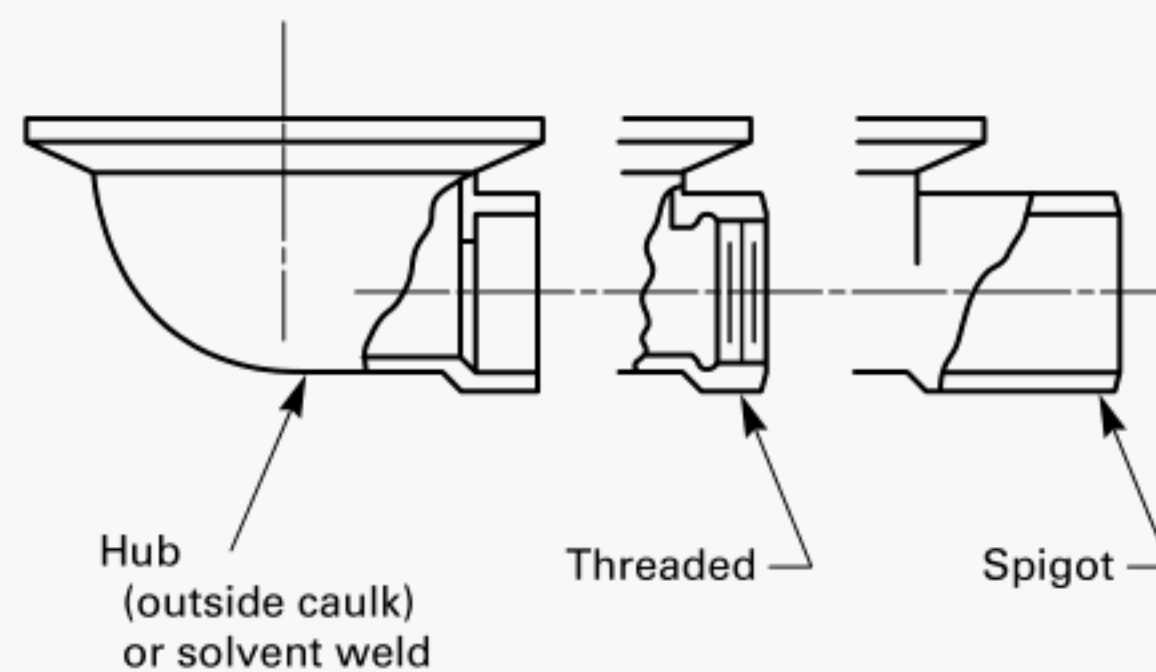
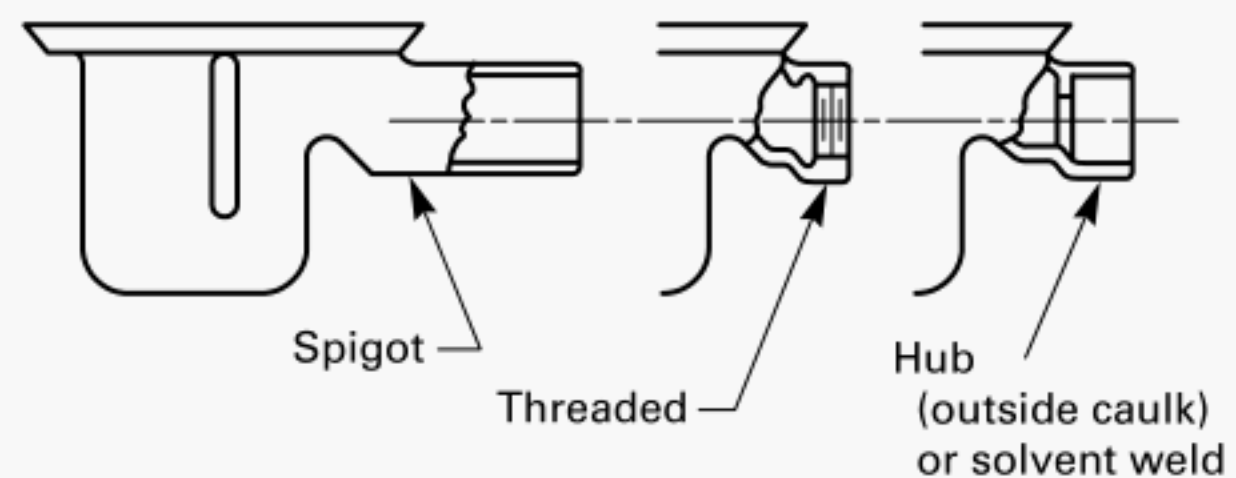
Fig. 5 Bottom Outlet**Fig. 6 Side Outlet****Fig. 7 Side Outlet Integral Trap**

Table 4 Grate-Free Area Requirements for Drains

Outlet Connection Size	Transverse Area of Connecting Pipe		Minimum Grate- Free Area	
	in. ²	cm ²	in. ²	cm ²
Floor and Trench Drains (Subject to Rainfall)				
2	3.14	20.3	6.5	41.9
3	7.06	45.5	14.0	90.3
4	12.50	80.6	25.0	161.3
5	19.60	126.4	40.0	258.0
6	28.30	182.5	56.0	361.2
All Other Drains				
2	3.14	20.3	5.0	32.3
3	7.06	45.5	11.0	71.0
4	12.50	80.6	18.0	116.1
5	19.60	126.4	30.0	193.5
6	28.30	182.5	42.0	270.9

4.3 Outlet Connection Types

4.3.1 Threaded. Threaded outlet connections shall have American NPT threads and shall comply with the dimensions specified in Table 1.

4.3.2 Inside Caulk. Outlet connections intended to be caulked on the inside shall comply with the dimensions specified in Table 2.

4.3.3 Hub (Outside Caulk). Hub connections (i.e., intended to be caulked on the outside) shall comply with the dimensions specified in Table 3.

4.3.4 Spigot (No-Hub). Spigot (no-hub) outlet connections shall comply with the dimensions for beadless connections specified in ASTM A74 or ASTM A888.

4.3.5 Solvent Cement. Outlet connections intended to be solvent-cemented shall comply with

- (a) ASTM D2661 for ABS drains
- (b) ASTM D2665 for PVC drains

4.3.6 Gasketed Joints. O-rings for gasketed joints shall comply with the applicable requirements of ASME A112.3.1, ASTM C564, ASTM C1440, or CSA B602.

4.3.7 Buttweld. Ends intended for butt-welding shall comply with ASME B16.25.

5 TOP DIMENSIONS — GRATE-FREE AREA

5.1 Grate-Free Area Requirements

Grate-free areas for floor and trench drains shall be as specified in Table 4.

5.2 Grate Openings

Grate openings shall be sized to exclude debris and support the anticipated loads.

5.3 Heel-Resistant Grates

The smallest dimension of grate openings for heel-resistant grates shall not exceed 8 mm (0.313 in.).

6 LOADING TEST — CLASSIFICATION AND TEST PROCEDURE

6.1 Loading Classifications

Grates and covers shall be assigned one of the following loading classifications, determined in accordance with the test procedure specified in para. 6.2:

(a) light duty: when the safe live load (see para. 6.2.3) is less than 900 kg (2,000 lb)

(b) medium duty: when the safe live load is equal to or greater than 900 kg (2,000 lb) but less than 2 250 kg (5,000 lb)

(c) heavy duty: when the safe live load is equal to or greater than 2 250 kg (5,000 lb) but less than 3 375 kg (7,500 lb)

(d) extra heavy duty: when the safe live load is equal to or greater than 3 375 kg (7,500 lb) but less than 4 500 kg (10,000 lb)

(e) special duty: when the safe live load is equal to or greater than 4 500 kg (10,000 lb).

6.2 Test Procedure for Grate Loading

6.2.1 Test Conditions. The load shall be applied gradually to the center of the test specimen using a platen 90 mm (3.5 in.) in diameter.

6.2.2 Point of Failure. The point of failure shall be the load at which

- (a) the first fracture on any part of the test specimen appears, for test specimens made of brittle materials; or
- (b) the permanent set (at the point of loading) is greater than 2% of the longest transverse dimension of the test specimen, for test specimens made of ductile materials

6.2.3 Test Specimen Material Classification. Test specimens made of several materials shall be deemed made of brittle or ductile materials depending on the material of which its structural portion is made.

6.2.4 Safe Live Load. The safe live load shall be the load at the point of failure divided by two.

7 WEATHERING TEST

7.1 Test Method

Plastic drains and related components, intended for exposure to outside elements, shall be tested for weathering in accordance with ASTM G152 or ASTM G153, or in accordance with Cycle B specified in ASTM D4329 (i.e., accelerated weathering). The test specimens shall be cut from the finished product or molded from the same material used to manufacture the finished product. The test duration shall be at least 2 000 h.

7.2 Pass/Fail Criteria

At the conclusion of the test, the

- (a) tensile strength shall be at least 90% of its original value
- (b) hardness shall be at least 20% of its original value

8 MARKINGS

Drains complying with this Standard shall be marked with the manufacturer's name or trademark. Markings shall be permanent, legible, and visible after installation.

NONMANDATORY APPENDIX A

OPTIONAL FEATURES AND DRAIN VARIATIONS

The optional features listed in Nonmandatory Appendix A identify the variations available for different applications (see Fig. A-1).

A-1 Anchor Flange

An anchor flange is a component that extends from the side of the drain body to enable anchoring of the drain to a concrete slab.

A-2 Auxiliary Inlet

An auxiliary inlet is an opening on the side of the drain body sump that receives discharge from another fixture, appliance, or drain.

A-3 Backwater Valve

A backwater valve is a component that prevents back-flow of wastewater or storm water into the building.

A-4 Clamping Device

A clamping device is a component intended to be installed in floors where a waterproof membrane or a metallic or composition flashing is required.

A-5 Dome Grate

A dome grate is a convex grate that has available a grate-free area above the floor level to enable drainage if debris collects around the base of the grate.

A-6 Extension

An extension is a component used to raise the grate to the floor level.

A-7 Floor Cleanout

A floor cleanout is a component that permits access to the drain line from finished floor level.

A-8 Hinged Grate

A hinged grate is a component that enables access to the drain without completely removing the secured grate from the body.

A-9 Secondary Strainer

A secondary strainer is an additional strainer, installed in the base of the drain body sump, that intercepts debris that might pass through the grate openings.

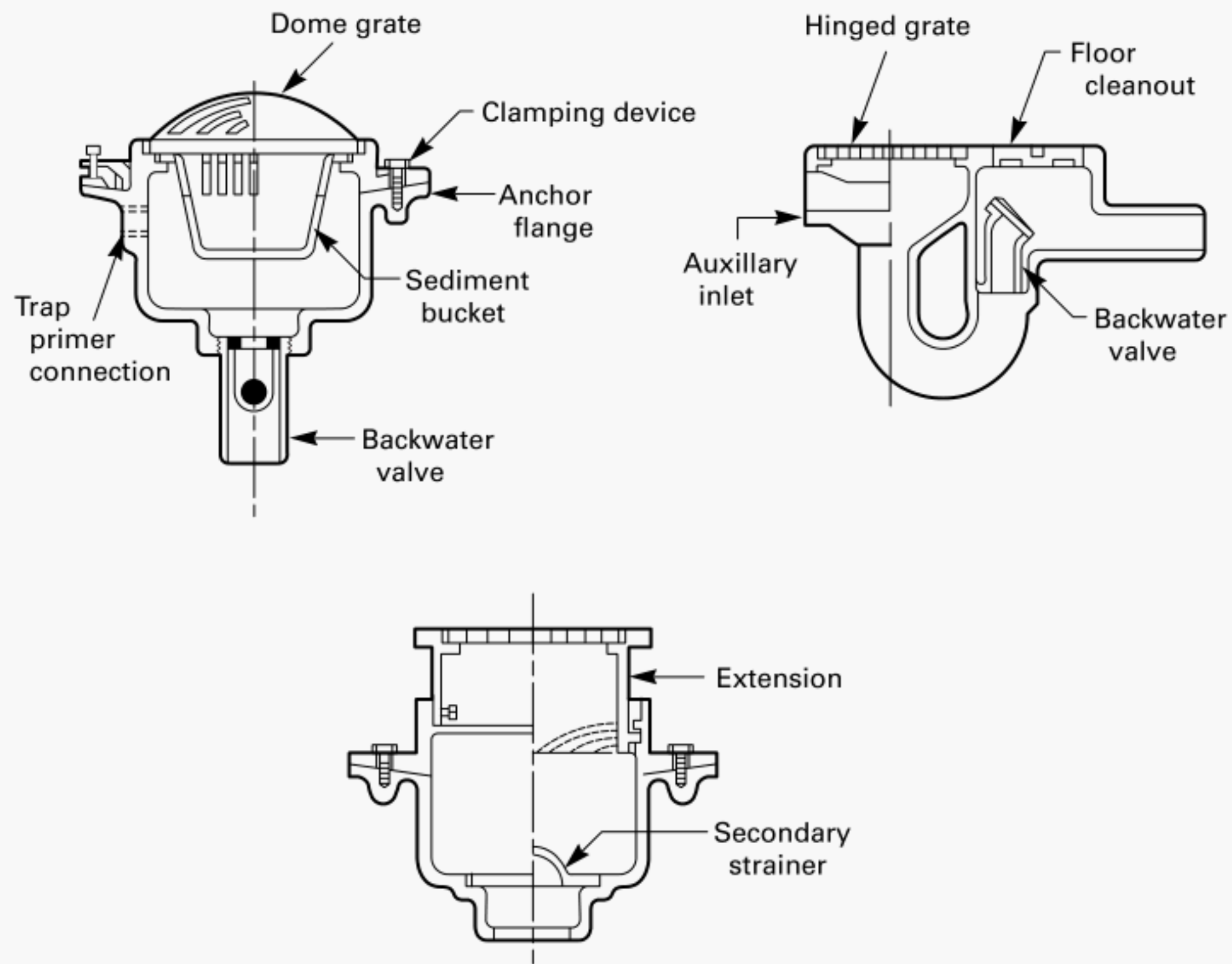
A-10 Sediment Bucket

A sediment bucket is a device that intercepts debris before it enters the drainage piping. Sediment buckets are typically installed in the drain body when drainage requirements dictate openings that allow entrance of debris.

A-11 Trap Primer Connection

A trap primer connection is a tapped boss on the drain body used to receive discharge from the trap primer valve.

Fig. A-1 Optional Features Available for Use with Drains



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Stainless Steel Drainage Systems for Sanitary, DWV, Storm, and Vacuum Applications, Above- and Below-Ground	A112.3.1-2007
Macerating Toilet Systems and Related Components	A112.3.4-2000 (R2004)
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Plumbing Waste Fittings	A112.18.2-2011/CSA B125.2-11
Performance Requirements for Backflow Protection Devices and Systems in Plumbing Fixture Fittings	A112.18.3-2002 (R2008)
Flexible Water Connectors	A112.18.6-2009/CSA B125.6-09 (R2014)
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Porcelain Enamelled Formed Steel Plumbing Fixtures	A112.19.4M-1994 (R2004)
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Hydraulic Performance Requirements for Water Closets and Urinals	A112.19.6-1995
Hydromassage Bathtub Appliances	A112.19.7/CSA B45.10-2012
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Dual Flush Devices for Water Closets	A112.19.10-2003 (R2008)
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