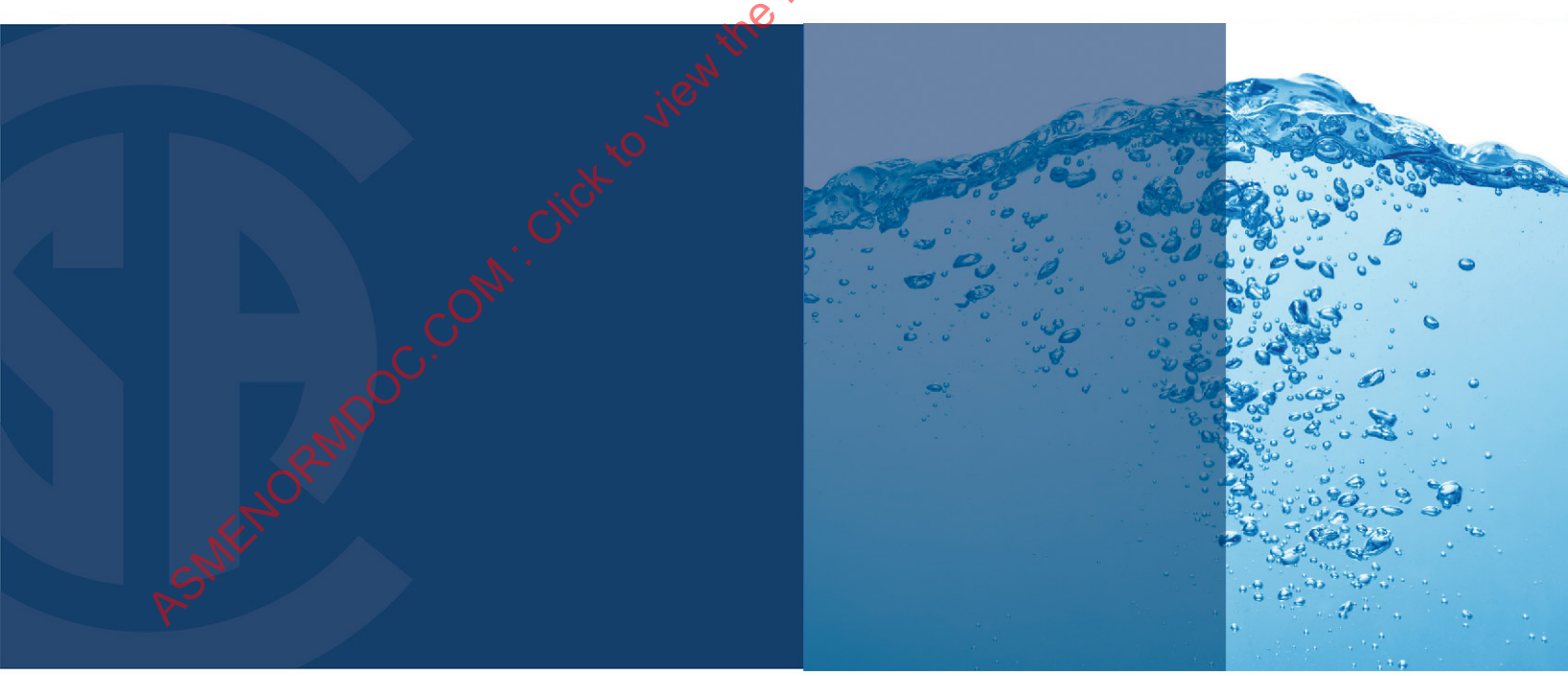
ASME A112.6.4-2022/ CSA B79.4:22

National Standard of Canada
American National Standard

Roof, deck, and balcony drains



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ASME A112.6.4-2022/CSA B79.4:22
Roof, deck, and balcony drains

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Preface

This is the first edition of ASME A112.6.4/CSA B79.4, *Roof, deck, and balcony drains*. It supersedes CSA B79,*Commercial and residential drains and cleanouts*, published in 2008, and the ASME A112.6.4, Roof, deck, and balcony drains Standards.

This Standard was prepared by the ASME/CSA Harmonization Task Group on Drains under the jurisdiction of the ASME A112 Standards Committee on Plumbing Materials and Equipment and the CSA Technical Committee on Drains and Interceptors. The ASME A112 Standards Committee operates under the jurisdiction of the ASME Board on Standardization and Testing and the CSA Technical Committee operates under the jurisdiction of the CSA Strategic Steering Committee on Construction and Civil Infrastructure.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

This Standard was approved as an American National Standard by the American National Standards Institute on June 15, 2022.

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2) *This standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard. The standards committee that approved the code or standard was balanced to ensure that individuals from competent and concerned interests had an opportunity to participate. The proposed standard was made available for public review and comment, which provided an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.*
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ASME A112.6.4-2022/CSA B79.4:22
Roof, deck, and balcony drains

1 Scope

1.1 Inclusions

This Standard specifies design and performance requirements for roof drains. This Standard applies to the following types of roof drains:

a) general purpose;
b) gutter and cornice;
c) parapet and promenade;
d) balcony; and
e) deck.

1.2 Exclusions

This standard does not apply to siphonic roof drains covered under ASME A112.6.9/CSA B79.9.

1.3 Illustrations

Figures 1 through 7 describe and portray typical roof drains and are not intended to restrict design or to specify requirements.

1.4 Terminology

In this Standard, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the Standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

1.5 Units of measure

The values given in either SI (metric) or U.S. Customary units of measure are equivalent in application; however, each measurement 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 measurement systems can result in non-conformance with this Standard.

1.6 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.

2 Reference publications

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

ASME (American Society of Mechanical Engineers)

B1.20.1-2003 (R2018)
Pipe Threads, General Purpose, Inch

B16.25-2017
Buttwelding Ends

ASME (American Society of Mechanical Engineers)/CSA Group

ASME A112.3.1-2007 (R2017)
Stainless Steel Drainage Systems for Sanitary DWV, Storm, & Vacuum Applications Above & Below Ground

ASME A112.6.3-2022/CSA B79.3:22
Floor drains

ASME A112.6.9-2022/CSA B79.9:22
Siphonic roof drains

ASME A112.18.1-2018/CSA B125.1-18
Plumbing Supply Fittings

ASTM International (American Society for Testing and Materials)

A48/A48M-03 (2016)
Standard Specification for Gray Iron Castings

A53/A53M-18
Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A74-20
Standard Specification for Cast Iron Soil Pipe and Fittings

A123/A123M-17
Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A153/A153M-16a
Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

A307-14e1
Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

A312/A312M-19
Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

A536-84 (2019) e1
Standard Specification for Ductile Iron Castings

A563-15
Standard Specification for Carbon and Alloy Steel Nuts

A653/A653M-20
Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

A888-20
Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications

B26/B26M-18e1
Standard Specification for Aluminum-Alloy Sand Castings

B85/B85M-18e1
Standard Specification for Aluminum-Alloy Die Castings

B117-19
Standard Practice for Operating Salt Spray (Fog) Apparatus

B152/B152M-19
Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar

B209/B209M-21
Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

B221-20
Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

B370-12 (2019)
Standard Specification for Copper Sheet and Strip for Building Construction

B584-14
Standard Specification for Copper Alloy Sand Castings for General Applications

B633-19
Standard Specification for Electrodeposited Coatings on Zinc on Iron and Steel

B766-86 (2015)
Standard Specification for Electrodeposited Coatings of Cadmium

C564-20
Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings

C1440-17
Standard Specification for Thermoplastic Elastomeric (TPE) Gasket Materials for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems

D638-14
Standard Test Method for tensile properties of plastics

D1784-20
Standard Classification System and Basis for Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

D2240-15e1
Standard Test Method for Rubber Property-Durometer Hardness

D2661-14e1
Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings

D2665-14
Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

D3222-21
Standard Specification for Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials

D3350-14
Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

D3965-16
Standard Classification System and Basis for Specifications for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Materials for Pipe and Fittings

D4066-13 (2019)
Standard Classification System for Nylon Injection and Extrusion Materials (PA)

D4101-17e1
Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials

D4329-13
Standard Practice for Fluorescent Ultraviolet (OV) Lamp Apparatus Exposure of Plastics

D5575-18
Standard Classification System for Copolymers of Vinylidene Fluoride (VDF) with Other Fluorinated Monomers

G152-13
Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

G153-13
Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

CISPI (Cast Iron Soil Pipe Institute)
301-18
Standard specification for hubless cast iron soil pipe and fittings for sanitary and storm drain, waste, and vent piping applications

CSA Group
B602:20
Mechanical couplings for drain, waste, and vent pipe and sewer pipe

C22.2 No. 0.15-15 (R2020)
Adhesive labels

UL (Underwriters' Laboratories)
969, edition 5
Standard for marking and labelling systems

3 Definitions and abbreviations

3.1 Definitions

The following definitions shall apply in this Standard:

Blow hole — 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.

Conductor — a pipe inside the building that conveys storm water from the roof to a storm or combined building drain.

Dome or grate open area — total area of drainage openings in the dome or grate.

Drain body — the central component of a drain fixture to which all other elements or accessories are directly or indirectly attached (see Figure 1).

Fin — a projection on castings due to imperfect joints.

Leader — an exterior drainage pipe for conveying storm water from roof or gutter drains.

No load — not intended for any loading (non-traffic areas only).

Overflow drain — a secondary or emergency rainwater receptor designed to receive and convey rainwater from roof areas.

Note: *The overflow drain is installed in the roof at a height to prevent excessive ponding of the rainwater on the roof. Overflow drains may be scuppers installed in a parapet wall or roof drains designed for the overflow (emergency) drainage function.*

Roof drain — a manufactured receptor designed to receive and convey rainwater from roof areas to the drainage system.

Note: *Roof drains are available in various designs, shapes, sump depths, and outlet locations. The area to be drained, location of the drain in the building structure, local rainfall intensity, and the drainage system are factors in determining the type of drain to be used.*

Scupper — a drain installed in the side of a wall, vessel, or gutter to convey rainwater away from the roof, deck, or vessel.

Target head elevation — prescribed elevation ± 3.2 mm (± 1/8 in).

Terminal head — the point in head elevation at which any further increase in head elevation does not increase the rate of discharge through the drain.

3.2 Abbreviations

The following abbreviations shall apply in this Standard:

ABS — acrylonitrile-butadiene-styrene
DWV — drain, waste, and vent
ID — inside diameter
NPT — National Pipe Tapered
OD — outside diameter
PE — polyethylene
PP — polypropylene
PVC — polyvinylchloride
PVDF — polyvinylidene fluoride

4 General

4.1 General purpose roof drains

4.1.1 Primary

General purpose roof drains are designed for installation in any roof area excluding the parapet of the roof structure; and are comprised of a drain body (sump), dome strainer, and gravel guard or membrane clamp. Optional components include underdeck clamp-standards, underdeck clamp-plywood substrates, expansion joints, and sump baskets (see Figure 1).

4.1.2 General purpose roof drain with overflow and flashing flange

The combination of roof drains, overflow sump, and flashing flange with dome strainers and gravel guards in one integral watertight unit is designed for flat roof construction, where independent overflow drainage is required. An optional feature includes a side outlet for special use in joist areas.

4.1.3 General purpose roof drain with integral overflow

A general purpose roof drain with integral overflow is a roof drain with the overflow drain within the body/sump of the primary drain as a single unit (see Figure 2).

4.2 Gutter or cornice roof drain

Gutter or cornice roof drains are installed in gutters, cornices, balconies, and other overhanging constructions to prevent overflow to areas below (see Figure 3).

4.3 Parapet roof drain

4.3.1 Overview

Parapet roof drains are installed in parapets for conveying rainwater from a roof area through the parapet (see Figure 4).

4.3.2 Parapet roof drain with flashing flange

Parapet roof drains with flashing flange are installed in mansard or parapet roofs.

4.3.3 Parapet roof drain with overflow

Parapet roof drains with integral flashing flange and overflow combination are installed in mansard or parapet roofs where independent overflow drainage is required (see Figure 5).

4.4 Promenade or deck roof drain

Promenade or deck roof drains are installed in roof decks subject to pedestrian or vehicular traffic. Such drains are fitted with flat grates (see Figure 6).

5 Materials

5.1 General

Drains shall be made of materials suitable for the intended service. Castings shall be sound and free of blow holes, cold shuts, fins, and other imperfections, and true to pattern.

5.2 Metals

5.2.1 Aluminum

Aluminum

a) sand castings shall comply with ASTM B26;
b) die castings shall comply with ASTM B85;
c) sheets and plate shall comply with ASTM B209; and
d) extruded bars, rods, wire, profiles, and tubes shall comply with ASTM B221.

5.2.2 Bronze

Bronze castings shall comply with the requirements of copper alloy UNS No. C83450, No. C83600, No. C83800, or No. C84400, as specified in ASTM B584.

5.2.3 Cast iron

Cast iron shall comply with the requirements of Class 25, as specified in ASTM A48/A48M.

5.2.4 Ductile iron

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

5.2.5 Nickel-bronze

Nickel-bronze alloys shall comply with the requirements of copper alloy UNS No. C97300, or No. C97600, or No. C99700, as specified in ASTM B584 or shall be an alloy with the following elements:

Element	Minimum content, %
Copper	60
Zinc	16
Nickel	12
Lead	5
Tin	3

5.2.6 Stainless steel

Stainless steel alloys shall be of the 300 or 400 Series.

5.2.7 Copper sheet

Copper sheet metal stampings shall be alloy UNS No. C11000, as specified ASTM B152. Copper shall be not less than 4882 g per square meter (16 oz per square feet) and shall conform to the mechanical and physical properties as specified in ASTM B370.

5.2.8 Sheet steel used in paint grip drain bodies

Sheet steel used in paint grip drain bodies shall be not less than 26 gauge and shall comply with the mechanical, physical, and chemical requirements specified in ASTM A653/A653M.

Note: *Paint grip steel is commonly known as bonderized steel.*

5.3 Polymeric compounds

5.3.1 Acrylonitrile-butadiene-styrene (ABS)

ABS shall meet or exceed the requirements of cell classification 32222, as specified in ASTM D3965.

5.3.2 Polyethylene (PE)

PE shall comply with the requirements of ASTM D3350.

5.3.3 Polypropylene (PP)

PP shall comply with the requirements of ASTM D4101.

5.3.4 Polyvinylchloride (PVC)

PVC shall meet or exceed the requirements of cell classification 12454 or 14333, as specified in ASTM D1784.

5.3.5 Polyvinylidene fluoride (PVDF)

PVDF shall comply with the requirements of ASTM D3222 or ASTM D5575.

5.3.6 Nylon

Nylon shall comply with the requirements of Types I through IV, as specified in ASTM D4066.

5.4 Steel fasteners

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

5.5 Finishes

5.5.1 General

Coated or plated components shall be prepared in such a way that a suitable surface for proper bonding of the finish is provided. Coated areas visible after installation shall be free of defects, and uncoated areas shall not be stained.

5.5.2 Non-organic finishes

5.5.2.1 Preparation

Parts to be coated with non-organic finishes shall be prepared as specified in Items a) to e), as appropriate:

a) Parts to be cadmium-plated shall be prepared and plated in accordance with ASTM B766.
b) Parts to be chrome-plated shall be polished before plating and subsequently given a commercial grade copper-nickel-chromium plate.
c) Parts to be given a commercial grade bronze chromate treatment shall first be given a commercial grade cadmium plate treatment.
d) Parts to be zinc plated shall be prepared in accordance with ASTM B633.
e) Parts to be hot-dip galvanized shall be coated in accordance with ASTM A153/A153M or ASTM A123/A123M.

Note: *See Clause 5.2.8 for paint grip applications.*

5.5.2.2 Corrosion-resistance test for non-organic finishes

5.5.2.2.1 Test specimens

Test specimens shall be as received from the manufacturer and shall not have been subjected to any other test.

5.5.2.2.2 Test procedure

Coated parts shall be tested in accordance with ASTM B117 for 24 h. Coated and uncoated parts may be polished or cleaned with a common household or metal cleaner before evaluation.

5.5.2.2.3 Pass/fail criteria

Upon completion of the testing specified in Clause 5.5.2.2.2,

a) coatings shall not show more than one surface defect in any 650 mm^2 (1.0 in^2) area that is visible after installation, or up to three surface defects on a 25 mm (1.0 in) length of parting line;
b) surface defects shall not be larger than 0.8 mm (0.03 in) in any dimension; and
c) if widely scattered surface defects are observed after testing (as occasionally occurs), such defects shall not significantly deface or adversely affect the function of the coated part.

5.5.3 Organic finishes

Organic finishes shall comply with the applicable coatings requirements of ASME A112.18.1/CSA B125.1.

6 Accessories

6.1 General

Clauses 6.2 through 6.5 describe accessories available for use in different roof drain applications (see Figure 7).

6.2 Extension collar

Extension collar is an accessory suitable for use with roof drains installed in a structural deck where an additional thickness of insulation is to be added in order to raise the top flange to the roof line.

6.3 Under-deck clamp

Under-deck clamp is an accessory to secure the roof drain to the roof deck by compressing the under-deck clamp against the underside of the deck.

6.4 Expansion joint

Expansion joint is an accessory to compensate for the expansion or movement of the conductor or roof.

6.5 Drain body or sump receiver plate

Drain body or sump receiver plate is a device that receives and uniformly supports the roof drain, distributing the weight of the drain over a large area of the roof.

7 Design requirements

7.1 Outlet centrelines

Depending on their location, outlets can be

a) a bottom outlet with a vertical centreline (see Figure 8);
b) a side outlet or side outlet with an integral trap, with a horizontal centreline (see Figure 9); or
c) a 45° angled outlet, with the centreline of the outlet at an angle (see Figure 10).

7.2 Outlet connections

7.2.1 General

The outlets identified in Clause 7.1 shall have one of the connections specified in Clauses 7.2.2 to 7.2.8.

7.2.2 Threaded outlet connections

Threaded outlet connections shall be American National Standard Taper Pipe Threads for general use (NPT), as specified in ASME B1.20.1, and female connections shall have the minimum dimensions specified in Table 1.

7.2.3 Inside caulk outlet connections

Inside caulk outlet connections shall have the dimensions specified in Table 2.

7.2.4 Hub (push-on) outlet connections

Hub (push-on) outlet connections shall have the dimensions specified in Table 3.

7.2.5 Spigot (no hub or mechanical joint) outlet connections

Outlet end of spigot (no hub or mechanical joint) connection shall comply with the outside diameter and minimum wall thickness specified in ASTM A53, ASTM A74, ASTM A312/A312M, ASTM A888, ASTM D2661, ASTM D2665, or CISPI 301.

7.2.6 Solvent-cemented outlet connections

Solvent-cemented outlet connections shall comply with the requirements of ASTM D2661 for ABS joints or ASTM D2665 for PVC joints.

7.2.7 O-ring, gasketed, and rubber coupling outlet connections

O-ring or gasketed outlet connections and rubber couplings for gasketed outlet connections shall comply with the applicable requirements of ASME A112.3.1, ASTM C564, ASTM C1440, or CSA B602.

7.2.8 Butt welded outlet connections

Outlet connections intended for butt welding shall comply with the requirements of ASME B16.25.

7.3 Drain body sump thickness

The minimum finished thicknesses for drain body sumps shall be as specified in Table 4.

7.4 Dimensions

7.4.1 Dome or grate open area

7.4.1.1 General

The dome or grate design of roof drains shall not promote ponding, impair safety, or trap fine debris.

7.4.1.2 Open area requirements

Dome or grate open area of roof, deck, and balcony drains shall comply with the minimum requirements of Tables 5 through 8.

Note: *Dome or grate open area in excess of outlet open area requirements are for the purpose of maintenance of full outlet diameter flow with partial obstruction of the dome or grate.*

7.4.2 Overflow size

The overflow shall not be less than the size of the required roof drain outlet and conductor or leader size.

8 Loading test — Loading classifications

Grates intended to be rated for top loading shall be tested and classified in accordance with Clause 6 of ASME A112.6.3/CSA B79.3. Domes, parapets, and grates classified as “no load” are not required to be tested for top loading.

9 Weathering test

9.1 Test specimens

The test specimens shall be cut from the finished product or molded from the same material used in manufacturing of the finished product.

9.2 Test procedure

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 duration shall be at least 2000 h. Following the completion of the weathering tests, hardness shall be tested in accordance with ASTM D2240, and tensile strength shall be tested in accordance with ASTM D638.

9.3 Pass/fail criteria

Upon completion of the test specified in Clause 9.2, the test specimen material shall maintain a

a) tensile strength of at least 90% of its original value; and
b) hardness of within ± 20% of its original value.

10 Flow measurement

10.1 Overview

The flow of general purpose roof drains shall be measured in accordance with Clause 10.2. In addition, the

a) flow characteristics of general purpose roof drains shall be verified experimentally and the results documented;
b) flow rate shall be determined by measuring the flow necessary to maintain the sustained water depth specified in Clause 10.3.2; and
c) flow measurements shall be conducted in an apparatus constructed as specified, in Figure 11, in this standard and in ASME A112.6.9/CSA B79.9, with a 1219 mm (48 in) long vertical discharge pipe with a nominal diameter equal to that of the outlet of the roof drain being tested.

Note: *Results obtained from application of flow measurement procedures indicate a flow rate achieved under laboratory conditions using 1219 mm (48 in) vertical discharge configuration; all added elements of drainage design will increase or decrease flow rates obtained in testing. Variables such as wind, vortices, debris, roof design, roof obstructions, slope, etc., can significantly change flow rate. Designers are advised to consider these and other possible variables in roof drainage system design.*

10.2 Flow measurement apparatus

The measurement apparatus shall consist of a tank with the dimensions specified in Figures 11 and 12. The level test section shall not deviate more than ± 4 mm (± 3/32 in) from the horizontal. The tank (A) shall have a maximum overall surface area of 5 m^2 (53.8 ft^2).

10.3 Flow rate measurement procedures

10.3.1 Procedure

The flow rate measurement procedure quantifies the relationship between the flow rate entering the drain fixture and the depth of water on the flat roof at the approach to the drain fixture.

10.3.2 Flow measurements

Flow measurements shall be taken at 25 mm (1 in) increments at target head elevations of 25 mm (1 in) through 152 mm (6 in), or terminal head, whichever occurs first, by means of pressure transducers in the Level test section (B), Figure 12. If terminal head occurs between a full inch increment and less than 152 mm (6 in), the head elevation and flow rate shall be recorded. Head elevations shall be measured from the top of the level test section (B) (see Figure 12).

10.3.3 Setup

The roof drain shall be installed in the centre of level test section (B) (see Figures 11 and 12) using:

a) an adapter plate measuring approximately 762 mm x 762 mm (30 in x 30 in) or having a diameter of 762 mm (30 in), as if the adapter plate was the finished roof surface; and

b) a roofing membrane, no thicker than nominally 1.6 mm (1/16 in), as flush as possible, sealing to the level test section (B) without creating flow obstructions or significant leaks; such that the roofing membrane top surface or the roof drain body flange top edge shall maintain a tolerance of +0 mm, –3.0 mm (+0 in, –0.13 in) relative to level test section (B) (see Figures 13 and 14). An installation aid may be used to attach the drain to the adapter plate so long as the previous dimensional criteria is met.

10.3.4 Transducer calibration

Pressure transducers shall be calibrated through zeroing out by filling the transducer tubes with water flush with the level test section (B), and assuring no air is in the tube. Water shall be levelled with the tube top and the pressure transducer shall indicate zero head elevation.

Note: *Levelling the water ensures that the zero indication in the transducers is equal to the elevation of level test section (B). Using a hard rubber squeegee effectively spreads the surface tension area, providing a more precise water level measurement.*

10.4 Achieving head elevations

To achieve head elevations specified in Clause 10.3.2, water shall be pumped from a reservoir to the tank at four points (C) (see Figure 11), measured with pressure transducers as specified in Clause 10.7.1 and a pump or array of pumps capable of providing the required flows.

10.5 Establishing head elevations

Water shall be pumped from a suitable reservoir to the test tank (A) (see Figures 11 and 12), increasing flow until the head elevations (specified in Clause 10.4) are achieved.

10.6 Data collection and steady state verification

10.6.1 Data recording

Recorded flow rates and head elevations shall be those values derived from the application of this Standard. Flow rates shall be recorded as litres per second [lps] or gallons per minute [gpm]. Head elevations shall be recorded as millimetres or inches. The flow rate shall be recorded for 5 min, collecting a total of 300 data points, recorded at the rate of once per second. During the 5 min recording period, the operator shall not make adjustments to the flowrate. Recorded data points (300) collected over the 5 min period for head and flowrate at each prescribed head elevation shall be averaged to determine the final values for publication.

10.6.2 Steady state verification

Steady state is defined as ± 3 mm (± 0.12 in) of average measured head elevation. If steady state conditions cannot be achieved, it shall be noted in the test report. The lab shall calculate the magnitude and frequency of the fluctuations. If the average measured head elevation deviates more than 3 mm (0.12 in) from the target head elevation, the recorded data shall be discarded for the subject increment, the flow rate adjusted and the measurement repeated at that elevation.

10.7 Measurement method

10.7.1 Head elevation

Head elevation measurement shall be by means of not less than two electronic transducers with an accuracy of ± 1 mm (± 0.04 in) located equidistant on a radius of 508 mm ± 25 mm (20 in ± 1 in) from the centre of the drain fixture as illustrated in Figure 11.

10.7.2 Flow rate

Flow rate shall be measured to an accuracy of ± 2% by a suitable flow measurement device located in the supply pump discharge line(s).

10.8 Roof Drain Performance Report

The Roof Drain Performance Report shall contain the following information:

a) manufacturer's name;
b) drain model number;
c) drain description;
d) drain size;
e) for each target head elevation:
   i) target head elevation;
   ii) average measured head elevation;
   iii) average measured flow rate;
   iv) if steady state was not achieved, the magnitude and frequency of the fluctuations; and
   v) if terminal head elevation was achieved before the 152 mm (6 in) increment, average measured head elevation and average measured flow rate at terminal head shall be reported; and
f) the wording: "Measured in accordance with ASME A112.6.4/CSA B79.4".

11 Manufacturer's literature

11.1 Roof drain performance data

The data reported in accordance with Clause 10.8, excepting target head elevation, shall appear in manufacturers' literature.

Note: *Such data are useful to designers for selecting roof drains and entering performance characteristics in design calculations.*

11.2 Additional data

The following text shall be included in the manufacturers' literature:

"Note: Results obtained from the application of flow measurement procedures specified in ASME A112.6.4/CSA B79.4 indicate a flow rate achieved under laboratory conditions using a 1219 mm

(48 in) vertical discharge pipe; all added elements of drainage design may increase or decrease the flow rates reported. Variables such as wind, vortices, debris, roof design, roof obstructions, and slope, can significantly change the roof drain flow rate. Designers are advised to consider these and other possible variables in rood drainage design."

12 Markings

12.1 Marking requirements

Roof drains complying with this Standard shall be marked with the manufacturers' name or trademark.

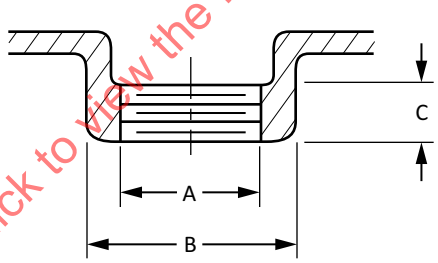
12.2 Marking locations

The markings shall be made on the dome, grate, or near the top rim of the drain body.

12.3 Permanent markings

The markings shall be permanent and legible. Examples of acceptable means of applying permanent markings shall include, firing on, etching, sand blasting, mechanical stamping, stamping with a permanent (non-water soluble) ink, or casting in. Adhesive labels that comply with CSA C22.2 No. 0.15 or UL 969 shall also be considered permanent when placed on a surface that is not normally submerged in water. The exposure conditions specified in Clause 7.1 of UL 969 shall apply.

Table 1
Threaded outlet connections
(See Clause 7.2.2.)



Nominal pipe size	A, NPT connection size	B, minimum OD, mm (in)	C, minimum thread length, mm (in)
1-1/2	1-1/2	59 (2.31)	11 (0.43)
2	2	73 (2.87)	11 (0.43)
2-1/2	2-1/2	85 (3.34)	16 (0.62)
3	3	105 (4.12)	19 (0.75)
4	4	130 (5.12)	20 (0.78)
5	5	159 (6.25)	22 (0.87)
6	6	184 (7.25)	25 (1.00)

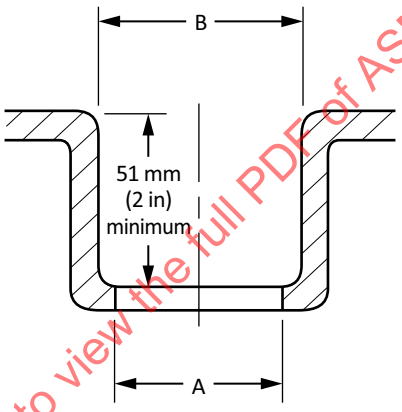
(Continued)

Table 1 (Concluded)

Nominal pipe size	A, NPT connection size	B, minimum OD, mm (in)	C, minimum thread length, mm (in)
8	8	235 (9.25)	27 (1.06)
10	10	288 (11.37)	29 (1.12)
12	12	339 (13.37)	30 (1.18)

Accompanying this Table is an illustration of a cross-section of a threaded connection component of a drain. The illustration identifies three key dimensions denoted by A, B, and C which correspond to the respective columns of the Table.

Table 2
Inside caulk outlet connections
(See Clause 7.2.3.)



Nominal outlet, connection size	A, minimum bottom ID, mm (in)	B, minimum socket ID, mm (in)
2	64 (2.50)	76 (3.00)
3	92 (3.62)	105 (4.12)
4	117 (4.62)	130 (5.12)
5	143 (5.62)	156 (6.12)
6	168 (6.62)	181 (7.12)
8	222 (8.75)	235 (9.25)

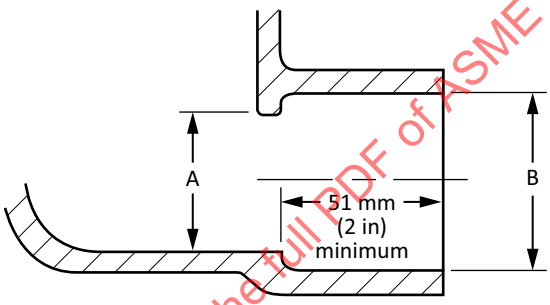
(Continued)

Table 2 (Concluded)

Nominal outlet, connection size	A, minimum bottom ID, mm (in)	B, minimum socket ID, mm (in)
10	270 (10.62)	283 (11.12)
12	321 (12.62)	333 (13.12)

Accompanying this Table is an illustration of a cross-section of an inside caulk outlet connection component of a drain. The illustration identifies two key dimensions denoted by A and B which correspond to the respective columns of the Table. A third dimension is given to be 51 mm (2 in) being the depth of the socket.

Table 3
Hub (push-on) outlet connections
(See Clause 7.2.4.)



Nominal outlet, connection size	A, maximum bottom ID, mm (in)	B, minimum socket ID, mm (in)
2	51 (2.00)	76 (3.00)
3	76 (3.00)	105 (4.12)
4	102 (4.00)	130 (5.12)
5	127 (5.00)	156 (6.12)
6	152 (6.00)	181 (7.12)
8	203 (8.00)	235 (9.25)
10	254 (10.00)	283 (11.12)
12	305 (12.00)	333 (13.12)

Accompanying this Table is an illustration of a cross-section of a hub (push-on) outlet connection component of a drain. The illustration identifies two key dimensions denoted by A and B which correspond to the respective columns of the Table. A third dimension is given to be 51 mm (2 in) being the depth of the hub.

Table 4
Minimum thickness of drain body sumps
(See Clause 7.3.)

Material	Minimum thickness, mm (in)
Aluminum (sand cast)	3.96 (0.156)
Aluminum (die cast)	3.96 (0.156)
Aluminum (extruded)	3.05 (0.120)
Bronze	3.96 (0.156)
Nickel-bronze	3.96 (0.156)
Cast iron	3.96 (0.156)
Ductile iron	3.96 (0.156)
Stainless steel (cast)	3.96 (0.156)
Stainless steel (plate, sheet, or strip)	
Horizontal surfaces*	0.635 (0.025)
Vertical surfaces†	0.559 (0.022)
Corners‡	0.508 (0.020)
Acrylonitrile-butadiene-styrene	3.96 (0.156)
Polyethylene	3.96 (0.156)
Polypropylene	3.96 (0.156)
Polyvinylchloride	3.96 (0.156)

* *The thickness of horizontal surfaces shall be determined by taking the average of three measurements from the bottom of the drain.*
† *The thickness of vertical surfaces shall be determined by taking the average of six measurements.*
‡ *The thickness at corners shall be determined by taking the average of six measurements.*

Table 5
Dome openings — General purpose roof drain
(See Clause 7.4.1.2.)

Nominal outlet connection size mm (in)	Minimum dome open area mm² (in²)
51 (2)	11 600 (18)
76 (3)	16 100 (25)
102 (4)	23 200 (36)
127 (5)	32 300 (50)
152 (6)	45 200 (70)

(Continued)

Table 5 (Concluded)

Nominal outlet connection size mm (in)	Minimum dome open area mm² (in²)
203 (8)	49 700 (77)*
254 (10)	58 100 (90)*
305 (12)	74 200 (115)*

* *Based on survey of industry norms.*

Table 6
Dome opening — Gutter or cornice roof drain
(See Clause 7.4.1.2.)

Nominal outlet connection size mm (in)	Minimum dome open area mm² (in²)
51 (2)	7097 (11)
76 (3)	7097 (11)
102 (4)	7097 (11)

Table 7
Dome openings — Parapet roof drain
(See Clause 7.4.1.2.)

Nominal outlet connection size mm (in)	Minimum dome open area mm² (in²)
51 (2)	7 100 (11)
76 (3)	9 700 (15)
102 (4)	9 700 (15)
127 (5)	21 900 (34)
152 (6)	21 900 (34)
203 (8)	32 900 (51)

Table 8
Grate openings — Promenade or deck roof drain
(See Clause 7.4.1.2.)

Nominal outlet connection size mm (in)	Minimum grate open area mm² (in²)
51 (2)	5 800 (9)
76 (3)	13 500 (21)
102 (4)	20 600 (32)
127 (5)	29 032 (45)

(Continued)

Table 8 (Concluded)

Nominal outlet connection size mm (in)	Minimum grate open area mm² (in²)
152 (6)	32 258 (50)
203 (8)	35 483 (55)

Figure 1
General purpose roof drain
(See Clauses 1.3, 3.1, and 4.1.1.)

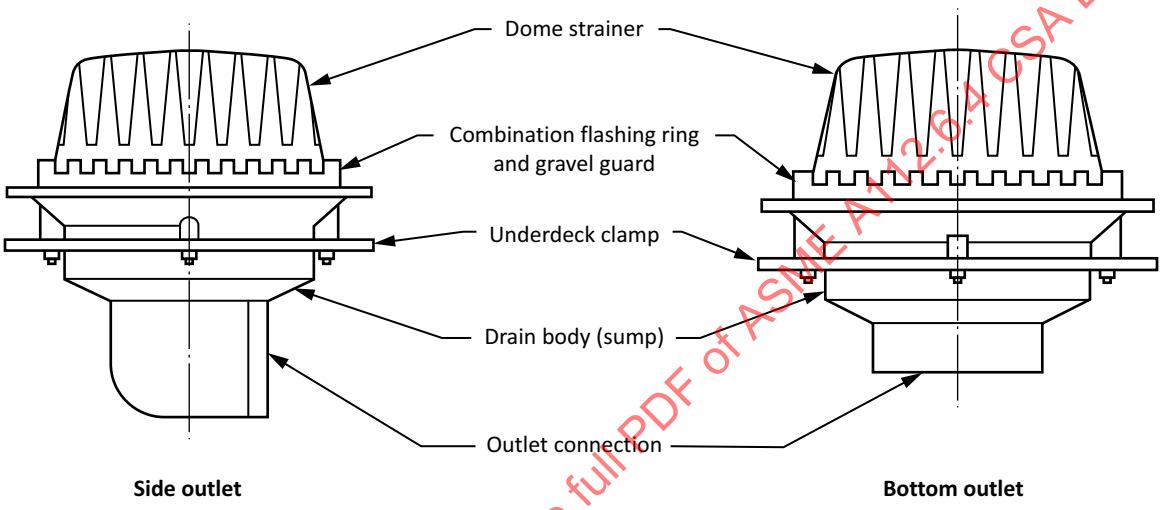


Illustration of a side outlet and bottom outlet roof drain with the name of the individual components identified. The location of the dome strainer, combination flashing ring and gravel guard, underdeck clamp, drain body (sump), and outlet connection are specifically pointed out on the illustrations.