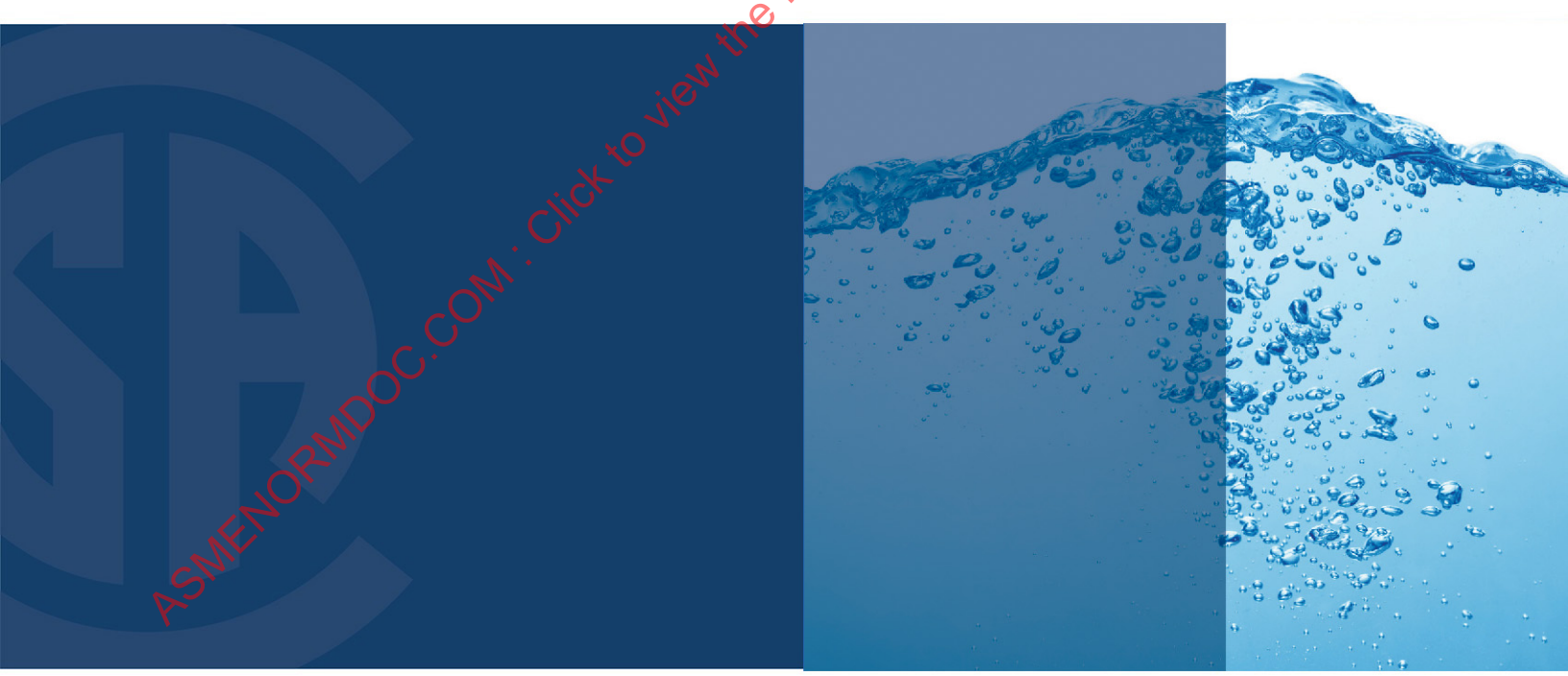
ASME A112.6.3-2022/ CSA B79.3:22

National Standard of Canada
American National Standard

Floor drains



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Floor drains

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Preface

This is the first edition of ASME A112.6.3/CSA B79.3, *Floor drains*. It supersedes CSA B79, *Commercial and residential drains and cleanouts*, published in 2008, and the ASME A112.6.3, Floor and Trench 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 May 9, 2022.

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

1 Scope

1.1 Inclusions

This Standard specifies design and performance requirements for floor drains, adjustable floor drains, and area drains that are used inside of, or adjacent to, building structures. Drains of outlet NPS 2 and smaller, intended only for installation in shower areas, are covered in this Standard and in ASME A112.18.2/CSA B125.2 as well.

1.2 Exclusions

This Standard does not apply to

a) seam-welded, socket type, stainless steel fabricated drains which are covered by ASME A112.3.1; and
b) trench drains, which are covered by ASME A112.6.8/CSA B79.8.

1.3 Illustrations

Figures 1 through 8 describe and portray typical 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 the 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 (The American Society of Mechanical Engineers)

A112.3.1-2007(R2012)
Stainless Steel Drainage Systems for Sanitary DWV, Storm, and Vacuum Applications, Above- and Below-Ground

A112.14.1-2003(R2017)
Backwater Valves

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

B16.25-2017
Buttwelding Ends

ASME (The American Society of Mechanical Engineers)/CSA Group

A112.6.8-2022/CSA B79.8:22
Trench drains

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

A112.18.2-2020/CSA B125.2:20
Plumbing Waste Fittings

CSA Group

B602-20
Mechanical couplings for drain, waste, and vent pipe and sewer pipe

B181.0-18
Definitions, general requirements, and methods of testing for thermoplastic nonpressure piping

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

ASTM International (American Society for Testing and Materials)

A48/A48M-03 (2016)
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-16a
Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

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

A307-14e1
Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

A312/A312M-21
Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

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

A563-15
Standard Specification for Carbon and Alloy Steel Nuts

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

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

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

B633-19
Standard Specification for Electrodeposited Coatings of 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

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

D4329-13
Standard Practice for Fluorescent Ultraviolet (IV) 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 Non-metallic Materials

G153-13
Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Non-metallic 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

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:

Backwater valve — a device used to prevent backflow of a liquid into a building or onto a surface being drained.

Blowhole — a hole in a casting caused by air or gas in the metal or mold.

Cold shut — a casing defect formed when two streams of metal become so cold that they do not fuse upon meeting, creating an incomplete casting.

Drain —

Adjustable floor drain — a floor drain designed for use in finished floor areas that have an adjustable strainer and grate to facilitate leveling with the finished floor (see Figure 1).

Area drain — a receptor intended to receive wastewater from an open area inside or immediately adjacent to the building structure, and convey it to the drainage system (see Figure 2).

Floor drain — a receptor intended to receive wastewater from building floors and convey it to the drainage system (see Figure 3).

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

Heel-resistant grate — a grate designed to resist entry of high-heeled shoes.
Note: *In the industry, heel-resistant grates are commonly referred to as heel-proof grates.*

Perimeter grate — a grate with openings along its outer edge, between the grate and the drain body (see Figure 4).

Top rim — the part of a drain that structurally supports the grate.

Trap — a fitting or device that provides a seal to prevent the back passage of gas without affecting the flow of wastewater.

Weep holes (seepage openings) — perforations above the seepage (flashing) flange intended to receive and direct leakage from around the perimeter of the drain into the drain sump.

3.2 Abbreviations

The following abbreviations shall apply in this Standard:

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

4 Materials

4.1 General

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

4.2 Metals

4.2.1 Aluminum

Aluminum

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

4.2.2 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.

4.2.3 Cast iron

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

4.2.4 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.

4.2.5 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

4.2.6 Stainless steel

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

4.3 Polymeric compounds

4.3.1 Acrylonitrile-butadiene-styrene (ABS)

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

4.3.2 Polyethylene (PE)

PE shall comply with the requirements of ASTM D3350.

4.3.3 Polypropylene (PP)

PP shall comply with the requirements of ASTM D4101.

4.3.4 Polyvinylchloride (PVC)

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

4.3.5 Polyvinylidene fluoride (PVDF)

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

4.4 Fastener materials

4.4.1 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.

4.4.2 Removable fasteners

Removable fasteners for grates shall be made of corrosion-resistant material or coated in accordance with Clause 4.5.

4.5 Finishes

4.5.1 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.

4.5.2 Non-organic finishes

4.5.2.1 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) Part 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.

4.5.2.2 Corrosion-resistance test for non-organic finishes

4.5.2.2.1 Test specimens

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

4.5.2.2.2 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.

4.5.2.2.3 Pass/fail criteria

Upon completion of the testing specified in Clause 4.5.2.2.2,

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.

4.5.3 Organic finishes

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

5 Design requirements

5.1 Outlet centrelines

Depending on their location, outlets shall be

a) a bottom outlet with a vertical centreline (see Figure 5);
b) a side outlet or side outlet with an integral trap, with a horizontal centreline (see Figures 6 and 7); or
c) an angled side or bottom outlet, with the centreline of the outlet at an angle (see Figure 8).

5.2 Outlet connections

5.2.1 General

The outlets specified in Clause 5.1 shall have one of the connections specified in Clauses 5.2.2 to 5.2.8.

5.2.2 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.

5.2.3 Inside caulk outlet connections

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

5.2.4 Hub (push-on) outlet connections

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

5.2.5 Spigot (no hub or mechanical joint) outlet connections

Outlet end of spigot (no hub or mechanical joint) connections 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.

5.2.6 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.

5.2.7 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.

5.2.8 Butt welded outlet connections

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

5.3 Drain body sump thickness

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

5.4 Clamping collars

Clamping collars designed to seal a waterproofing membrane shall be secured with not less than three bolts. Drain bodies and clamping rings shall have smooth mating surfaces.

5.5 Weep holes (seepage openings)

Weep holes may be provided at the option of the manufacturer. When provided, weep holes shall have a combined (i.e., total) area of not less than 21 mm^2 (0.032 in^2), and the smallest dimension shall be not less than 3.0 mm (0.118 in).

5.6 Threaded fasteners

Threaded fasteners shall have standard commercial threads and shall be capable of being installed and removed by standard plumbing tools or manufacturer-provided tools.

5.7 Top dimensions — Grate openings

5.7.1 General

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

5.7.2 Grate open area calculation

The area of the grate openings shall be the sum of the minimum projected area of each grate opening when viewing from above the grate, perpendicular to its top surface. For all grates other than perimeter grates, only the grate itself shall be considered in the measurement of the grate openings; no other part of the drain shall be considered.

5.7.3 Minimum areas of grate openings

The minimum areas of the grate openings shall be as specified in Table 5.

5.7.4 Perimeter grates

The area of the grate openings for perimeter grates (see Figure 4) shall include the minimum projected area of the openings between the grate and the top rim when viewing from above, perpendicular to its top surface.

5.7.5 Heel-resistant grates

The smallest dimension of grate openings for heel-resistant grates shall not exceed 8.0 mm (0.313 in).

5.8 Backwater valves integral to drains

Backwater valves integral to drains shall comply with the applicable requirements of ASME A112.14.1 or CSA B181.0.

5.9 Drain integral traps

5.9.1 General

Drains with a side outlet may have an integral trap within the body sump.

5.9.2 Integral traps

Integral traps shall

a) have a trap seal depth of not less than 50 mm (2 in); and
b) have a liquid seal that does not depend on the action of moving parts.

6 Load test

6.1 Load classifications

Grates and covers shall be assigned one of the following load classifications, determined in accordance with the test procedure specified in Clauses 6.5 and 6.6.

Load classification	Safe live load (minimum design load), kg (lb)	Test load, kg (lb)
LD light duty	200 (441)	400 (882)
MD medium duty	900 (1984)	1800 (3968)
HD heavy duty	1650 (3638)	3300 (7276)
XHD extra Heavy duty	3402 (7500)	6804 (15 000)
SD special duty	4536 (10 000)	9072 (20 000)

6.2 Load at failure

The load at failure shall be

a) the load at which the first fracture on any part of the test specimen appears; for brittle materials (see Clause 6.3); or

b) the load at which the permanent set (at the point of loading) is greater than 2% of the longest transverse dimension of the specimen for ductile materials (see Clause 6.3 and Figure 9).

6.3 Test specimen material classification

Test specimens made of several materials shall be deemed made of brittle or ductile materials depending upon the material of which its structural portion is made.

6.4 Test platen

The platen shall have a diameter of

a) 90 mm (3.5 in), for grates and covers 114 mm (4.5 in) or larger in diameter, or in width for rectangular grates; or

b) 50 mm (2 in), for grates and covers smaller than 114 mm (4.5 in).

6.5 Test procedure

The load test shall be conducted as follows:

a) Mount the test specimen in accordance with the manufacturer's instructions.

b) Using the platen specified in Clause 6.4, gradually apply a load at the centre of the specimen until the test load specified in Clause 6.1, or the load at failure, as specified in Clause 6.2, is reached, whichever is reached first (i.e., whichever load is smaller).

6.6 Safe live load

The safe live load shall be

a) calculated by dividing by two the test load or the load at failure determined in Clause 6.5, whichever is smaller; and

b) used to determine the load classification, in accordance with Clause 6.1.

7 Weathering test

7.1 Test specimens

The test specimens shall be cut from the finished product or modeled from the same material used to manufacture the finished product.

7.2 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 not less than 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.

7.3 Pass/fail criteria

Upon completion of the test specified in Clause 7.2, the test specimen material shall maintain a

a) tensile strength of not less than 90% of its original value; and
b) hardness within 20% of its original value.

8 Markings

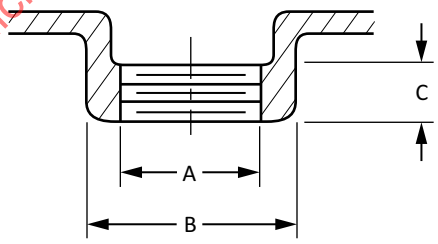
8.1 Marking requirements

Drains complying with this Standard shall be marked with the manufacturer's name or trademark. The markings shall be permanent, legible, and be made on the grate, cover, or near the top rim of the drain.

8.2 Permanent markings

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 connections
(See Clause 5.2.2.)



A, NPT connection size	B, Minimum OD, mm (in)	C, Minimum thread length, mm (in)
1-1/2	59 (2.31)	11 (0.43)
2	73 (2.87)	11 (0.43)
2-1/2	85 (3.34)	16 (0.62)
3	105 (4.12)	19 (0.75)

(Continued)