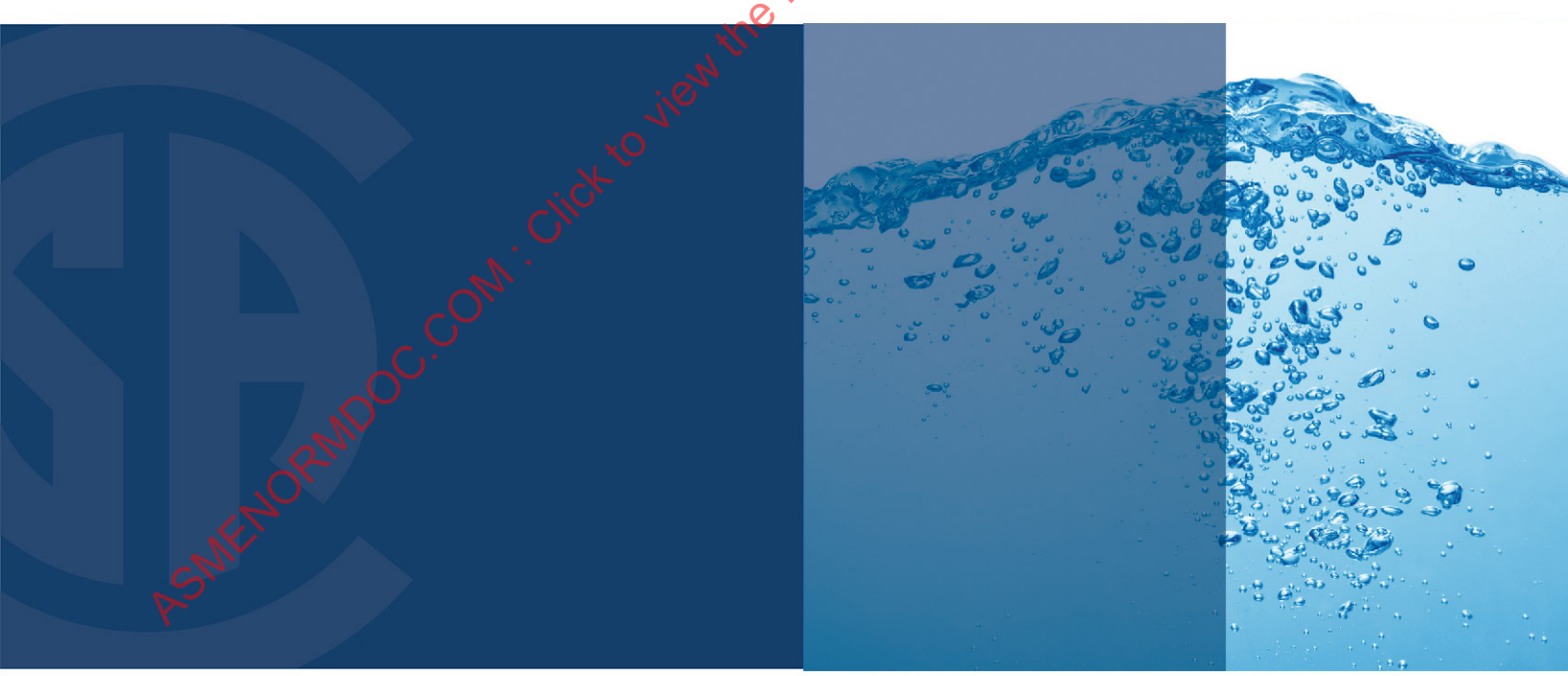
ASME A112.6.8-2022/ CSA B79.8:22

National Standard of Canada
American National Standard

Trench drains



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Trench drains

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Preface

This is the first edition of ASME A112.6.8/CSA B79.8, *Trench drains*. It supersedes CSA B79, *Commercial and residential drains and cleanouts standard*, published in 2008, and the testing and certification requirements for trench drains of the ASME A112.6.3-2019, *Floor and Trench Drains* Standard.

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

1 Scope

1.1 Inclusions

This Standard specifies design and performance requirements for trench drains, utility channels, and grate systems that are used inside of, or adjacent to, building structures that are typically non-residential.

Note: *These channels are not typically subject to high-speed vehicles but can be subjected to concentrated heavy loads such as hard-wheeled forklifts.*

1.2 Linear shower drains

Drains with outlet size NPS-2 and smaller, intended only for installation in shower areas, are covered in ASME A112.18.2/CSA B125.2 and can also be covered in this Standard.

1.3 Illustrations

Figures 1 through 7 illustrate typical trench and slot 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)/CSA Group

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

ASME A112.18.2-2020/CSA B125.2:20
Plumbing waste fittings

CSA Group

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

AASHTO (American Association of State Highway and Transportation Officials)

M306-10
Standard specification for drainage, sewer, utility, and related castings

AISI (American Iron and Steel Institute)

1008
Carbon steel (UNS G10080)

1010
Carbon steel (UNS G10100)

ASTM International (American Society for Testing and Materials)

A36/A36M-19
Standard specification for carbon structural steel

A307-21
Standard specification for carbon steel bolts, studs, and threaded rod 60 000 PSI tensile strength

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

C39/C39M-21
Standard test method for compressive strength of cylindrical concrete specimens

C307-18
Standard test method for tensile strength of chemical-resistant mortar, grouts, and monolithic surfacings

C579-18
Standard test method for compressive strength of chemical-resistant mortars, grouts, monolithic surfacings, and polymer concretes

C580-18
Standard test method for flexural strength and modulus of elasticity of chemical-resistant mortars, grouts, monolithic surfacings, and polymer concretes

C666/C666M-19
Standard test method for resistance of concrete to rapid freezing and thawing

C1202-19
Standard test method for electrical indication of concrete's ability to resist chloride ion penetration

D570-98 (2018)
Standard test method for water absorption of plastics

D638-14
Standard test method for tensile properties of plastics

D695-15
Standard test method for compressive properties of rigid plastics

D790-17
Standard test methods for flexural properties of unreinforced and reinforced plastics and electrical insulating materials

D3350-14
Standard specification for polyethylene plastics pipe and fittings materials

D4101-17e1
Standard classification system and basis for specification for polypropylene injection and extrusion materials

EN (European Standards)
1433:2005
Drainage channels for vehicular and pedestrian areas — Classification, design and testing requirements, marking and evaluation of conformity

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:

Channel — the lower portion of the trench drain used for conveyance of liquids or as a utility raceway.

Channel flow area — total unobstructed area perpendicular to the direction of flow through the channel. Refer to Figure 3.

Channel width — the maximum internal width of the channel flow area. Refer to Figure 3.

Encapsulation concrete — concrete that surrounds and secures the manufactured trench drain.

Frame — a component, separate or integral to the channel, that supports the grate.

Free or open area — total unobstructed projected area of the openings in a grate or slot.

Heel-resistant — a grate designed to resist entry of small heeled shoes.

Reveal width — the external dimension at the top surface which is visible after installation.

Slot drain — a channel configuration in which the width of the opening near the surface, with or without a grate, is significantly narrower than the channel width.

Slot width — the internal width of the opening at the top surface of a slot drain.

Trench cover — a solid cover not intended as a primary intake for surface drainage.

Trench drain — a receptor, typically long and narrow in shape, designed with or without slope to receive and convey liquids to the drainage system.

Trench grate — the top component of a trench drain with the primary intake openings. Refer to Figure 6.

Weep hole — a perforation above a seepage (flashing) flange intended to receive and direct leakage from around the perimeter of the drain into the channel or outlet.
Note: *Weep holes are sometimes referred to as seepage openings.*

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
OSB — oriented strand board
PE — polyethylene
PP — polypropylene
PVC — polyvinylchloride
PVDF — polyvinylidene fluoride

4 Material

4.1 General

Trench drains shall be made of materials suitable for the intended service. Trench drain bodies shall be sound and free of holes, cracks, other imperfections, and true to pattern.

Unless otherwise specified in Clause 4.2, trench drains and components shall be made of materials and have the finishes specified in ASME A112.6.3/CSA B79.3.

4.2 Other materials

4.2.1 Polymer concrete

Polymer concrete shall have a:

a) minimum compressive strength of 90 MPa (13 000 psi) when tested in accordance with ASTM C579;
b) minimum bending strength of 24 MPa (3500 psi) when tested in accordance with ASTM C580;
c) minimum tensile strength of 14 MPa (2000 psi) when tested in accordance with ASTM C307; and
d) freeze thaw maximum weight loss of 1% when tested for 300 cycles in accordance with Procedure A of ASTM C666.

4.2.2 Precast concrete

Precast concrete shall have a

a) minimum compressive strength 75 MPa (10 878 psi) when tested in accordance with ASTM C39;
b) freeze thaw maximum weight loss of 1% when tested for 300 cycles in accordance with Procedure A of ASTM C666; and
c) minimum chloride ion low penetration when tested in accordance with ASTM C1202.

4.2.3 Fiberglass

Fibreglass shall have a

a) minimum lengthwise tensile strength of 75 MPa (11 000 psi) when tested in accordance with ASTM D638;
b) minimum lengthwise compressive strength of 75 MPa (11 000 psi) when tested in accordance with ASTM D695;
c) minimum lengthwise flexural strength of 55 MPa (8000 psi) when tested in accordance with ASTM D790; and
d) maximum water absorption of 0.7% after 24 h immersion in accordance with ASTM D570.

Note: *Surfaces cut for test sample production can be sealed.*

4.2.4 Thermoplastic compounds

4.2.4.1 Polyethylene (PE)

PE used for manufacturing trench drains, exclusive of additives, shall comply with ASTM D3350 and shall have a

a) minimum tensile strength at yield of 15 MPa (2200 psi) per ASTM D638; and
b) minimum flexural modulus of 138 MPa (20 000 psi) per ASTM D790.

4.2.4.2 Polypropylene (PP)

PP used for manufacturing trench drains, exclusive of additives, shall comply with ASTM D4101 and shall have a

a) minimum tensile strength at yield of 15 MPa (2200 psi) when tested in accordance with ASTM D638; and
b) minimum flexural modulus of 600 MPa (87 000 psi) when tested in accordance with ASTM D790.

4.2.5 Steel

Steel used for manufacturing trench drains shall comply with ASTM A36, ASTM A653, AISI 1008, or AISI 1010. Steel used for manufacturing fasteners shall comply with Clause 4.3.1.

4.3 Fastener materials

4.3.1 Carbon steel fasteners

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

4.3.2 Removable fasteners

Removable fasteners for grates shall be made of or coated with corrosion-resistant material or coated in accordance with Clause 4.5 of ASME A112.6.3/CSA B79.3.

5 Design requirements

5.1 Outlets

Outlets of trench drains shall comply with Clause 5.2 of ASME A112.6.3/CSA B79.3. End outlets of trench drains shall comply with the side outlet requirements.

5.2 Top dimensions — Areas of grate openings

5.2.1 Area calculations

The area of grate openings shall be calculated in accordance with Clauses 5.7.2, Grate open area calculation, and 5.7.4, Perimeter grates, of ASME A112.6.3/CSA B79.3.

5.2.2 Area per unit length

The area of the grate openings per unit length shall be calculated by dividing the area calculated in Clause 5.2.1 by the length of the grate. The results shall be stated in cm^2/m or in^2/ft.

5.2.3 Heel-resistant grates

Heel-resistant grates shall comply with the applicable requirements of ASME A112.6.3/CSA B79.3.

5.2.4 Grate opening blocking

Opening in the grate for securing devices or that otherwise could be blocked during installation shall not be included in the calculation of the area of the grate openings.

5.3 Channel flow area determination

The channel flow area shall be calculated or measured as the projected area at the deepest section of the channel body (see Figures 3, 4, and 5).

In addition, the channel flow area shall be calculated for the channel body only and shall not include obstructions from other components that can be present in the drain.

6 Load test procedures

6.1 General

6.1.1 Channel testing options

The load test for channels shall be conducted in accordance with one of the test procedures specified in Clause 6.2, at the option of the manufacturer.

6.1.2 Grate and cover testing options

The load test for grates and covers shall be conducted in accordance with one of the test procedures specified in Clause 6.3, at the option of the manufacturer.

6.1.3 Slot drain testing options

The load test for slot drains shall be conducted in accordance with one of the test procedures specified in Clause 6.4, at the option of the manufacturer.

6.2 Channel load test options

6.2.1 AASHTO M306 load test option

6.2.1.1 Procedure

The load test for channels, grates, and covers shall be conducted in accordance with Clause 6 of AASHTO M306, with the following exceptions:

a) Channels may be provided with the frame assembled if deemed necessary by the manufacturer.
b) The channel, or the channel and frame, shall be installed in accordance with the manufacturer's installation instructions.
c) A load plate of 230 mm (9 in) long by the applicable grate width shall be placed in the channel.
d) A buffer layer of 13 mm (0.5 in) thick oriented strand board (OSB) may be used between the load plate and the channel.
e) The load plate shall be of suitable strength to transfer the load to the channel without deforming or breaking.
f) The testing location restriction shall not apply.

6.2.1.2 Failure criteria

There shall be no cracks or permanent deformation of the channel or frame detrimental to the loading capacity of the channel.

6.2.2 EN 1433 load test option

The load test for channels or channels and frames shall be conducted in accordance with Clause 9.1 of EN 1433.

6.2.3 ASME A112.6.3/CSA B79.3 load test option

6.2.3.1 Procedure

The load test for channels, grates, and covers shall be conducted in accordance with Clause 6 of ASME A112.6.3/CSA B79.3, with the following exceptions:

a) The channel, or the channel and frame, shall be installed in accordance with the manufacturer's installation instructions.

b) A load plate of 230 mm (9 in) long by the applicable grate width shall be placed in the channel.
c) A buffer layer of 13 mm (0.5 in) OSB may be used between the load plate and the channel. The load plate shall be of suitable strength to transfer the load to the channel without deforming or breaking.

6.2.3.2 Failure criteria

There shall be no cracks or permanent deformation of the channel or frame detrimental to the loading capacity of the channel.

6.2.4 Encapsulation concrete strength test

6.2.4.1 Procedure

The encapsulation concrete strength verification test for channels shall be conducted as follows:
a) Pour four test cylinders in accordance with ASTM C39 using concrete from the same batch used to pour the channel load test specimens.
b) Conduct a concrete load test on two cylinders 28 days or more after pouring. If the average result of the concrete load test does not meet the minimum manufacturer's requirements, the remaining two cylinders may be tested after additional cure time.

6.2.4.2 Testing lab requirements

The load test specified in Item b) of Clause 6.2.4.1 shall be conducted at a facility accredited or specialized in concrete testing and with a testing apparatus calibrated within the previous 12 months.

Note: *An acceptable means of demonstrating compliance with this Clause is by conducting the test at a laboratory accredited by the Cement and Concrete Reference Laboratory (www.ccrl.us) or an equivalent.*

6.2.4.3 Failure criteria

The average compressive strength of the two cylinders shall be within 6.9 MPa (1000 psi) of the manufacturer's requirements for concrete.

6.3 Grate and cover load test options

6.3.1 AASHTO M306 load test option

Grates and covers shall be tested in accordance with Clause 6 of AASHTO M306 with the exception that the testing location restriction shall not apply.

6.3.2 EN 1433 load test option

Grates and covers shall be tested in accordance with Clause 9.1 of EN 1433.

6.3.3 ASME A112.6.3/CSA B79.3 load test option

6.3.3.1 Procedure

Grates and covers shall be tested in accordance with Clause 6 of ASME A112.6.3/CSA B79.3.

6.3.3.2 Failure criteria

The failure
a) mode for brittle materials shall be as specified in ASME A112.6.3/CSA B79.3; and
b) load for ductile materials shall be the load at which the permanent set is greater than 3% of the grate width.

6.4 Slot drain test

6.4.1 Installation of test specimens

Slot drain test specimens shall be installed in accordance with the manufacturer's installation instructions. If the manufacturer provides a grate, the grate shall be installed for the test.

6.4.2 AASHTO M306 load test option

Slot drain assemblies shall be tested in accordance with Clause 6 of AASHTO M306

a) using a platen measuring 90 mm x 230 mm (3.5 in x 9 in) platen (see Figure 8); and
b) with the exception that the testing location restriction in AASHTO M306 shall not apply.

6.4.3 EN1433 load test option

Slot drains shall be tested in accordance with Clause 9.1 of EN 1433.

6.4.4 ASME A112.6.3/CSA B79.3 load test option

Slot drains shall be tested in accordance with Clause 6 of ASME A112.6.3/CSA B79.3 using the 90 mm (3.5 in) diameter platen (see Figure 8).

7 Markings

7.1 General

Drains 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.

7.2 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.

8 Literature

Manufacturers shall make available

a) installation instructions;
b) the grate open area per unit length determined in Clause 5.2.2 in cm^2/m and in^2/ft;
c) the flow area at the deepest end of each channel section, expressed in mm^2 (in^2);
d) the reference standard used for the load test and the load rating of the grate and the channel, measured in accordance with Clause 6;
e) the channel width and reveal width (see Figure 3);
f) for slot drains, the channel width, reveal width, and slot width (see Figure 5); and
g) the concrete compressive strength and thickness used to achieve the channel body load rating.