Summary of Substantive Changes
between the 2003 edition of ASME A112.6.4,
2008 edition of CSA B79 and the
2022 edition of ASME A112.6.4/CSA B79.4 "Roof, deck, and balcony drains"
(New Harmonized Standard)

Presented to the IAPMO Standards Review Committee on March 13, 2023

General: The changes to this standard may have an impact on currently listed products. The substantive changes are:

- Specifying materials standards such as ASTM B26 where before the standard identified the grades.
- Minimum material properties for PE and PP.
- Load testing per ASME A112.6.3/CSA B79.3.
- Weathering (UV resistance) from ASTM G23 to ASTM G152 or G153.
- Introduction of flow testing, Section 10.

Revised from ASME

1 Scope

1.1 ~~Scope~~ Inclusions

~~*This Standard establishes minimum design requirements for roof drains, including general purpose, gutter and cornice, parapet and promenade, balcony, or deck types, which convey rainwater from the roof area of building structures. It includes definitions, nomenclature, outlet types and connections, dome or grate-free area, top loading classifications, materials and finishes, and accessories.*~~ *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 879.9.

~~ASME 1.5, CSA 1.3~~ 1.3 Illustrations

~~*The illustrations (figures) included in this Standard are intended only to describe and portray typical roof drain types and are not intended to restrict design or to be used for specification purposes.*~~ *Figures 1 through 7 describe and portray typical roof drains and are not intended to restrict design or to specify requirements.*

2 Reference publications: *Publications referenced in this standard will be to the editions listed in Section 2.*

4 General

4.1 General purpose roof drains

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,).

Revised from CSA and ASTM

5.2 Metals

5.2.1 Aluminum

Aluminum

a) sand castings shall comply with ASTM B26~~, aluminum alloy UNS No. A03190~~ or*;*

b) die castings shall comply with ASTM B85~~, aluminum alloy UNS No. A13800~~;

c) sheets and plate shall comply with ASTM B209; and

d) extruded bars, rods, wire, profiles, and tubes shall comply with ASTM B221.

5.2.4 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.

~~ASTM 5.1.10 Sheet Steel in Bonderized Drains~~.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 A 525 and ASTM A 527ASTM*~~ *A653/A653M*.

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

New Figure 2 was added. (Remaining figures were renumbered)
Figure 5 (previously Figure 4) was replaced with new figure.

Revised from CSA and ASME

4 Material

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.

Section 8 from ASME A112.6.4 and CSA B79 were revised. (See new language below):

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 04329 (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 g 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 rote. 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 (BJ. Using a hard rubber squeegee effectively spreads the surface tension area, providing o 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 foss 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 879.4".

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 879.4 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

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12.3 Permanent markings

The markings shall be permanent and legible. Examples of acceptable means of applying permanent markings shall lnc1ude, 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.