



**Summary of Substantive Changes  
between the 2016 and 2021 editions of  
CSA B66 “Design, material, and manufacturing requirements for prefabricated septic tanks  
and sewage holding tanks”**

**Presented to the IAPMO Standards Review Committee on November 15, 2021**

**General:** The change to this standard should not have an impact on currently listed products. The major changes are:

- Expanded the scope to include reaction-injection moulded thermosets (see Sections 1.1, 4.1.5, 9, and Table 1)
- Expanded the scope to include compression moulded tanks (see Section 8.4)

Section 1, Scope: Expanded the scope to include reaction-injection moulded thermosets as follows:

**1 Scope**

**1.1**

*This Standard specifies minimum design and material requirements as well as manufacturing practices and markings for prefabricated septic tanks, sewage holding tanks, and effluent chambers made of*

- a) *steel;*
- b) *concrete;*
- c) *fibreglass-reinforced plastic (FRP);*
- d) *[reaction-injection moulded thermosets; and](#)*
- e) *polyvinylchloride (PVC), polypropylene (PP), polyethylene (PE), or other thermoplastics that are designed to handle sewage or sewage effluent.*

**1.2**

*This Standard ~~can be used to assess~~ [includes criteria for assessing](#) other ~~than septic~~ tanks and holding tanks [used in sewage systems](#) for structural [sufficiency integrity](#) and watertightness, [such as](#)*

***Note:** ~~Other tanks used in sewage systems include, but are not limited to, the following:~~*

- a) *tanks used for wastewater treatment plants;*
- b) *tanks used as ~~trash~~ [pretreatment](#) tanks;*
- c) *pre-aeration tanks;*
- d) *sewage flow-equalization tanks; and*
- e) *tanks used for pit privies.*

Section 2, Reference publications: Referenced standards have been updated, added or deleted as follows:

**CSA Group**

A23.1:~~1419~~/A23.2:~~1419~~

*Concrete materials and methods of concrete construction/Test methods and standard practices for concrete*

A3000-~~1318~~

*Cementitious materials compendium*

A3001-~~1318~~

*Cementitious materials for use in concrete*



~~CAN/CSA-B45 Series-02 (R2013)~~

~~Plumbing fixtures~~

B45.6:~~0211~~ (R~~2013~~2020)

*Nonrecirculating toilets, vacuum toilets, and waste-holding tanks for use in recreational vehicles*

B1800:~~1521~~

*Thermoplastic nonpressure piping compendium*

B182.4:~~1521~~

*Profile polyvinylchloride (PVC) sewer pipe and fittings*

B182.6:~~1521~~

*Profile polyethylene (PE) sewer pipe and fittings for leak-proof sewer applications*

G30.18-09 (R~~2014~~2019)

*Carbon steel bars for concrete reinforcement*

W186-M1990 (R~~2012~~2016)

*Welding of reinforcing bars in reinforced concrete construction*

#### **ASTM International**

A1064/A1064M-~~16b~~18a

*Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete*

C78/C78M-~~1621~~

*Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)*

C1116/C1116M-10 ~~Rev A~~ (R2015)

*Standard Specification for Fiber-Reinforced Concrete*

C1609/C1609M-~~1219a~~

*Standard Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam With Third-Point Loading)*

D648-18

*Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position*

D695-15

*Standard Test Method for Compressive Properties of Rigid Plastics*

D790-~~15e~~217

*Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials*

D1248-~~1216~~

*Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable*

D1693-15e1

*Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics*

#### **IAPMO Group**

Z1000-2019

*Prefabricated Septic Tanks*

#### **NSF International**

NSF/ANSI 40-~~2013~~2019

*Residential Wastewater Treatment Systems*



**ULC (Underwriters Laboratories of Canada)**

CAN/ULC-S601-14 [Rev 1](#)

Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids

CAN/ULC-S603-14 [Rev 1](#)

Standard for Steel Underground Tanks for Flammable and Combustible Liquids

CAN/ULC-S603.1: ~~11~~ [2017](#)

Standard for External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids

CAN/ULC-S652:2016 [Rev 1](#)

Standard for Tank Assemblies for the Collection, Storage and Removal of Used Oil

Section 3, Definitions: The following definition was deleted:

~~Recognized testing facility—an accredited facility or a facility used by an accredited conformity assessment organization.~~

Section 4, General Requirements:

**4.1 All Tanks**

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**4.1.4.2**

~~Tanks assessed only for structural sufficiency and watertightness shall comply with the following sections of this Standard that set out material, manufacturing practice, structural, and marking requirements:~~

~~a) Clause 4.1.1;~~

~~b) Clause 4.1.2;~~

~~c) Clause 4.1.3;~~

~~d) Clause 4.1.4;~~

~~e) Clause 4.1.5;~~

~~f) Clause 4.1.6;~~

~~g) Clause 4.2.6;~~

~~h) Clause 6, 7, or 8 in its entirety;~~

~~i) Clause 9 in its entirety (as applicable); and~~

~~j) Clause 10 in its entirety.~~

**4.1.5 Inlet and outlet connectors**

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**4.1.5.3**

Inlet and outlet connectors shall not require installation methods involving impact or mechanical removal of tank wall material other than

a) full coring of a steel, fibreglass-reinforced polyester, [reaction-injection moulded thermosets](#), PE, PP, PVC, or other thermoplastic tank wall;

b) full wet coring of a concrete tank wall; or

c) impact removal of up to 50% of a concrete tank wall thickness (e.g., knockouts).



## 4.2 Septic Tanks

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### 4.2.8 Compartmentalization

A chamber divider shall be used only when a septic chamber is to be divided into compartments. The divider shall

- a) divide the chamber into two or more compartments in such a way that the first compartment has a liquid volume of two-thirds ( $\pm 5\%$ ) of the working capacity of the entire chamber;
- b) be permanently fastened in place or form an integral part of the septic tank structure;
- c) comply with Clause ~~9.3~~ [10.3](#);
- d) prevent floating materials and settled solids (i.e., scum and sludge) from passing (but need not be watertight);
- e) extend from the tank bottom to at least 150 mm above the liquid level or, in septic tanks without an air space, to the top of the tank; and
  - i. have an outlet device in the larger compartment and an inlet device in the smaller compartment, both of which shall comply with Clause [4.2.3](#); or
  - ii. a design that permits liquid to travel between compartments through one or more opening(s) that are located at points ~~55-50%~~ to ~~65~~ [75%](#) of the entire liquid depth above the septic tank floor. The total area of these openings shall be three to seven times the area of the inlet opening.

### 4.5 Tanks assessed only for structural integrity and water tightness

Tanks, other than septic and sewage holding tanks, assessed only for structural integrity and watertightness, shall comply with the following clauses:

Clause 4.1(materials, quality control, assembly, strength and watertightness, inlets and outlets, and metallic fasteners);

Clause 4.2.6(access openings);

Clause 5, 6, 7, 8, or 9, as applicable (steel, concrete, fibreglass-reinforced, thermoplastic, and thermoset tank requirements);

Clause 10(tests); and

Clause 11(markings).

Section 7, Fibreglass-reinforced polyester tanks:

## 7.2 Laminate

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### 7.2.3 Interior anti-wicking layer

The interior anti-wicking layer shall consist of chemical-resistant material and shall be reinforced with not less than 20% and not more than 30% by mass of ~~mat~~ [chopped glass strands](#) or chopped strand mat. Filler shall not be used in this layer. The combined thickness of the interior chemical-resistant layer and the interior anti-wicking layer shall be at least 2.5 mm.

**Note:** Fourier transform infrared spectroscopy (FTIR) and scanning electron microscopy (SEM) are suitable means of verifying the interior anti-wicking layer requirements of this clause.



### **7.3 Materials**

#### **7.3.1 Resins**

##### **7.3.1.1 Compatibility**

The tank or resin manufacturer shall provide a statement of compatibility of the resin for the fluids that will be contained in the tank. The tank manufacturer shall adhere to the resin supplier's recommendations on the selection of resins ~~including the proportions of the materials in the resin compound.~~

##### **7.3.1.2 Isophthalic and terephthalic resins**

For septic and holding tank applications, isophthalic and terephthalic acid-based polyester resins that comply with the following requirements shall be acceptable and shall not require evaluation in accordance with Clause 7.3.1.1:

- a) minimum heat distortion temperature of 75 °C when tested in accordance with ASTM D648 with a load of 1.82 MPa; and
- b) maximum elongation of 6% when tested in accordance with ASTM D638.

Source: As referenced in IAPMO Z1000-2019, Prefabricated Septic Tanks, Section 6.2.1.2, Isophthalic and Terephthalic.

### **8.3 Injection-moulded tanks**

#### **8.3.1 Compound**

Injection-moulded tanks shall be manufactured from thermoplastic material yielding the minimum physical properties as follows:

- a) a flexural modulus of elasticity greater than or equal to 861.4 MPa in accordance with ASTM D790;
- b) a tensile strength greater than or equal to 16.56 MPa in accordance with ASTM D638;
- c) the compound complies with ASTM D1248, Class B (requiring an ultraviolet stabilizer) or Class C (requiring a minimum of 1% carbon black); and
- d) environmental stress crack resistance complying with Clause 10.6.

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Section 8.4, Compression-moulded tanks: Expanded the scope to include compression moulded tanks as follows:

#### **8.4 Compression-moulded tanks**

##### **8.4.1 Resin**

The resin may be combined with copolymers, pigments, unidirectional tape, woven fabric, glass fibres, and impact modifiers that together are suitable for manufacture.

Source: As referenced in IAPMO Z1000-2019, Prefabricated Septic Tanks, Section 7.4.1, Compound.

##### **8.4.2 Compound**

Compression-moulded tanks shall be manufactured from thermoplastic material yielding the minimum properties as follows:

- a) a flexural modulus of elasticity complying with Table 1 in accordance with ASTM D790;
- b) a tensile strength complying with Table 1 in accordance with ASTM D638; and

##### **8.4.3 Wall thickness**

Side walls, tops, bottoms, and covers shall have a minimum and combined average wall thickness as specified in Table 1. Chamber dividers and partitions shall not be less than 1.5 mm thick.

Source: As referenced in IAPMO Z1000-2019, Prefabricated Septic Tanks, Section 7.4.3, Wall Thickness.



Section 9, Rejection moulded thermoset tanks: Expanded the scope to include reaction-injection moulded thermosets as follows:

### **9 Reaction-injection moulded thermoset tanks**

#### **9.1 Compound**

Liquid cross-linking thermoset polymer resins for reaction-injection moulded thermoset tanks may be combined with copolymers, pigments, and impact modifiers, which together are suitable for manufacture.

#### **9.2 Physical properties**

Reaction-injection moulded tanks shall be manufactured from liquid cross-linking thermoset polymer resins yielding the minimum physical properties as follows:

- a) a tensile strength greater than or equal to 44.8 MPa in accordance with ASTM D638;
- b) a flexural strength greater than or equal 68.9 MPa in accordance with ASTM D790;
- c) a flexural modulus of elasticity greater than or equal to 1860 MPa in accordance with ASTM D790;
- d) a compressive strength greater than or equal to 62.0 MPa in accordance with ASTM D695; and
- e) a notched Izod impact resistance greater than or equal to 133 J/m in accordance with ASTM D256.

Section 10, Testing (effluent chambers, septic tanks, and sewage holding tanks): Revised vacuum test procedure and failure criteria as follows:

### **9.2.3 10.2.3 Vacuum test**

#### **10.2.3.1 Procedure**

The vacuum test shall be conducted as follows:

- a) ~~Bed~~ Position an empty tank on a level, hard surface, or in a dry sand bed to a depth not exceeding 100 mm, with the tank oriented as in service.
- b) Seal the tank and apply an internal vacuum of 75 mmHg/m of the maximum depth of earth cover recommended by the manufacturer. The internal vacuum shall be not less than 50 mmHg.
- c) Once the system is stable, hold the vacuum for  $60 \pm 5$  min.
- d) Release the vacuum.
- e) ~~Check for deformation of~~ Visually examine the tank ~~Ensure that the hatches and inlet and outlet fittings do not lose their seal or become distorted~~ and access opening cover(s) for evidence of cracks, permanent deformation, displaced joints, or other structural damage.
- f) Remove and replace the access opening cover in accordance with the manufacturer's instructions.

#### **Notes:**

- 1) Tanks should be properly braced and supported before testing.
- 2) Precautions should be taken to prevent injury caused by unforeseen occurrences such as sudden structural failure.
- 3) An internal vacuum may be applied to the tank prior to the vacuum test to confirm that the tank is sealed and testing equipment is functioning properly. Sealing and testing equipment adjustments can be made prior to the start of the vacuum test.
- 4) Should the internal vacuum fall below the internal vacuum as specified in Item b) by 10%, the pressure can be returned to the level specified in Item b) and the 60 min test period can continue. This process can be repeated up to three additional times during the test period.
- 5) If a test plate is used to apply an internal vacuum, visual examination of the test plate is not required.

#### **10.2.3.2 Failure criteria**

Any one of the following shall constitute failure of the test:

- a) the inability to maintain the internal vacuum as required in Clause 10.2.3.1;
- b) losing the seal or permanent distortion of the access opening cover(s) and inlet and outlet fittings; or



c) permanent deformation, displaced joints, or other structural damage of the tank or access opening cover(s).

**9.2.4 10.2.4 Top-loading test**

**9.2.4.1 10.2.4.1 Temperature and duration**

The top-loading test shall be performed at  $20 \pm 2$  °C, and the minimum duration shall be 72 h.

**9.2.4.2 10.2.4.2 Procedure**

The top-loading test shall be conducted as follows:

- a) ~~Bed~~-Position an empty tank on a level, hard surface, or in a dry sand bed to a depth not exceeding 100 mm, with the tank oriented as in service.
- b) ~~and record~~ Measure the initial width of the tank ( $w_0$ ).

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**9.2.4.3 Verification 10.2.4.3 Failure criteria**

~~The deformed width (w) of the tank under load shall be as follows:~~ There shall be no cracking or other damage. In addition, the width of the tank under load at

- a)  ~~$w_{1h}$~~  shall not exceed  $1.07 \times w_0$  (i.e.,  $w_1 < 1.07 \times w_0$ );
- b)  ~~$w_{48}$~~  48 h shall not exceed  $1.12 \times w_0$  (i.e.,  $w_{48} < 1.12 \times w_0$ ); and
- c)  ~~$w_{72}$~~  72 h shall not exceed  $1.05 \times w_0$  (i.e.,  $w_{72} < 1.05 \times w_0$ ).

Section 11, Markings and instructions: Added requirements for providing information with markings as follows:

**11.2 Information**

The following information shall be provided on each marking or label:

- a) the manufacturer's name or trademark;
- b) the last two digits of the year of manufacture;
- c) the working capacity of the septic chamber or septic tank expressed in litres;
- d) the volume of the effluent chamber or tank per centimetre of depth, expressed in litres;
- e) the type(s) of tank;

Note: The following is a list of examples of tank types:

- a) sewage holding tank (H);
- b) trickle-type septic tank (T);
- c) septic tank with effluent chamber for siphon applications (S);
- d) septic tank with effluent chamber for pump applications (P);
- e) effluent chamber tank for siphon applications (ES); and
- f) effluent tank for pump applications (EP).
- f) the maximum burial depth for which the tank is designed, expressed in metres;
- g) for a concrete tank, a marking to indicate whether it is suitable for sulphate or non-sulphate soils, i.e., "SUL" or "NON-SUL";
- h) the allowable installation conditions; and
- i) the statement "CSA B66 structural integrity and watertightness requirements only" when evaluated in accordance with Clause 4.5.

Table 1 was added:

Table 1 "Minimum properties for compression-moulded tanks based on the wall thickness"