**Summary of Substantive Changes**
**between the 2010 and 2016 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 March 13, 2017**

**General:** The change to this standard will likely have an impact on currently listed products. The major changes are:

- Expanded the scope of the standard to include additional thermoplastic materials and applications. (see Section 1).
- Revised and clarified the general requirements for materials, assembly and the applicable strength and structural requirements for tanks assessed only for structural soundness (see Sections 4.1.1 and 4.1.3 and 4.1.4)
- Changed one of the allowable fittings from a TY type to T fitting (see Section 4.1.5)
- Reduced the number of openings required through a chamber divider from two to one (see Section 4.2.8)
- Changed the referenced standards for allowable compliance of steel reinforcement and added a requirement for all welding of reinforcing bars (see Section 6.1.3.2)
- Revised the section title to differentiated between thermoplastic manufacturing methods, added requirements for Injection-moulded tanks and changed the required wall thickness of blow-moulded and rotational-moulded PE tanks (see Section 8)
- Added an allowance to conduct the strength testing of concrete tanks by the top-loading method (see Section 9.2)
- Clarified the fill level required for conducting the chamber divider and partition tests (see Section 9.3.1)
- Added a requirement to mark or label with the allowable installation conditions (see Section 10)

Section 1, Scope: Expanded the scope of the standard to include additional materials and applications as follows:

*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 steel, concrete, fiberglass-reinforced plastic, polyvinylchloride (PVC), polypropylene (PP), ~~or~~ polyethylene (PE), or other thermoplastics that are designed to handle sewage or sewage effluen*t.

*1.2*
*This Standard can be used to assess tanks, other than septic tanks and holding tanks, for structural sufficiency and watertightness.*
*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 tanks;*
*c) pre-aeration tanks;*
*d) sewage flow-equalization tanks; and*
*e) tanks used for pit privies.*

Section 2, Reference publications: Updated the referenced standards and added and removed the following references;

*CSA Group*

*W186-M1990 (R2012), Welding of reinforcing bars in reinforced concrete construction*

*ASTM International (American Society for Testing and Materials)*

*A1064/ A1064M-16b, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete*

*D638-14, Standard Test Method for Tensile Properties of Plastics*

*ULC (Underwriters' Laboratories of Canada)*

~~S616-81 (withdrawn)~~

~~Standard for the Testing of Liquid Protective Coating Materials as Required by ULC-S603.1 for Use in Connection with the Corrosion Protection of Underground Tanks~~

Section 3, Definitions: Added additional definitions as follows:

*Compound - a mixture of polymer(s) with other ingredients such as fillers, stabilizers, plasticizers, pigments, dyes, or curing agents.*

*Extrusion (extruded) - a method whereby heated or unheated plastic is forced through a shaping orifice to become one continuously formed piece.*

*Pigment - an organic or inorganic colour body added to the plastic to provide colour and/or opacity.*

*Pipe stiffness - the resistance to elastic deformation under applied stress; the value is obtained by dividing the parallel plate load in N (at a deflection of 5%) by the length of the pipe in metres and then by the actual deflection in mm (at a testing speed of 12.5 mm/min).*

*Note: The resulting value is in units (N/m•mm) that are dimensionally the same as those used for pressure and stress [which is commonly expressed in kilopascals (kPa)J; however, N/m•mm and kPa are different quantities and should not be confused with each other.*

*Plastic - a material that*

*a) contains one or more organic polymer substances of large molecular weight as an essential ingredient;*

*b) is solid in its finished state; and*

*c) can be shaped by flow at some stage in its manufacture or processing into finished product.*

*Note: Rubber, textiles, adhesives, and paints, which in some cases meet this definition, are not considered plastics.*

*Polyolefin - a polymer produced from a simple olefin as a monomer.*

*Siphon - a plumbing device designed in such a way that it will perform consecutive fill-and-flush cycles automatically without attention or interference.*

Section 4, General requirements:
4.1 All tanks: Clarified the general requirements for materials as follows:
*4.1.1 Materials*
*Fittings, pipes, baffles, devices, fasteners, partitions, chamber dividers,* ~~*and other components shall be made of a durable material compatible with the tank material.*~~ *gaskets, sealants, joining materials, and other components shall be made of a material*
*a) compatible with the tank material;*
*b) designed to withstand loads exerted under the maximum depth of earth cover;*
*c) capable of withstanding freezing conditions; and*
*d) resilient to acids and alkalis that can be present in soil and sewage.*

Section 4.1.3, Assembly, Clarified the requirements for joints and on-site assembly as follows:
*All materials for proper assembly shall be provided with each tank.* ~~*On-site assembly of components by an installer shall be kept to a minimum. Any joint made on site shall be as durable and watertight as the tank itself.*~~ *Installation-site assembly (i.e., assembly at a location other than the tank manufacturing facility or manufacturer-authorized assembly facility) of tanks and components by an installer shall be kept to a minimum.*
*Tanks consisting of multiple sections shall have joints*
*a) exerting uniform pressure on the joining material along the entire joint length;*
*b) providing a continuous watertight seal;*
*c) constructed using gaskets, sealants, or joining materials complying with Clause 4.1.1; and*
*d) as durable and watertight as the tank itself.*

4.1.4 Strength and watertightness: Clarified the applicable requirements for tanks assessed for structural sufficiency and watertightness as follows:
*4.1.4.1*
*Tanks shall be designed to carry a minimum of 600 mm of earth cover. Tanks shall not be damaged when tested in accordance with Clause 9.2. Chambers, fittings, and tanks shall not leak when tested in accordance with Clause 9.4.*
*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.*

Section 4.1.5, Inlet and outlet connectors: Expanded to include allowance for installation of connectors in (PP) Polypropylene tanks as follows:

*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, 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).*

*Inlet and outlet connectors installed by the methods specified in Items a) to c) shall be placed within a zone designated by the manufacturer and shall include a fitting with a flexible rubber or rubber link interface between the pipe and the tank wall.*

Section 4.2.3, Inlet and outlet devices: Changed one of the allowable fittings from a TY type to T fitting as follows:

*4.2.3.1 Inlet devices*

*The inlet to a septic chamber shall*

*a) be an open-topped T~~Y~~ fitting, a baffle, or an elbow fitting;*

*Note: An unvented elbow fitting used as an inlet device will prevent sewage gases from entering a building's plumbing vent stack and should be used when the vent stack is made of copper or another material that can be corroded by sewage gases.*

*b) extend not less than 75 mm into the liquid level; and*

*c) be beneath an air space at least 25 mm high, when an open-topped device is used.*

Section 4.2.8, Compartmentalization: Reduced the number of openings required through a chamber divider from two to one as follows:

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

*f) have*

*i) 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 ~~two~~one or more ~~equally spaced~~ opening(s) that are located at points 55% to 65% 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.*

Section 6.1.3.2, Steel reinforcement: Changed the referenced standards for allowable compliance of steel reinforcement and added a requirement for all welding of reinforcing bars as follows:

*6.1.3.2.1*

*~~When used in prefabricated concrete tanks,~~ Steel reinforcement shall comply with CSA G30.18 or ASTM A1064/A1064M~~, ASTM A82/A82M, ASTM A185/A185M, ASTM A496/A496M, or ASTM A497/A497M.~~*

*6.1.3.2.4*

*All welding of reinforcing bars shall conform to the requirements of CSA W186.*

Section 8, Thermoplastic tanks: Revised the section title to differentiated between mold manufacturing methods, added requirements for Injection-moulded tanks and changed the required wall thickness of blow-moulded and rotational-moulded PE tanks as follows:

*~~8 Polyethylene and polyvinylchloride~~Thermoplastic tanks*

*8.1 Blow-moulded and rotational-moulded polyethylene tanks*

*8.1.1 Compound*

*The compound in polyethylene tanks shall comply with ASTM D1248, Class B (requiring an ultraviolet stabilizer) or Class C (requiring a minimum of 1% carbon black). Stress crack resistance shall be tested in accordance with Clause 9.6.*

*8.1.2 Wall thickness*

*Side walls, tops, bottoms, inlet end, outlet end, and covers of polyethylene tanks shall be not less than 3 mm thick and have a minimum average wall thickness of 5 mm ~~thick. Inlet and outlet ends shall be not less than 3 mm thick.~~ Chamber dividers and partitions shall be not less than 1.5 mm thick.*

*8.3 Injection-moulded tanks*

*8.3.1 Compound*

*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 0790;*

*b) a tensile strength greater than or equal to 16.56 MPa in accordance with ASTM 0638;*

*c) the compound complies with ASTM 01248, Class 8 (requiring an ultraviolet stabilizer) or Class C (requiring a minimum of 1% carbon black); and*

*d) environmental stress crack resistance complying with Clause 9.6.*

*8.3.2 Wall thickness*

*Side walls, tops, bottoms, and covers shall have a minimum average thickness of 5 mm. Chamber dividers and partitions shall be not less than 1.5 mm thick.*

Section 9.2, Strength tests: Added allowance to conduct the strength testing of concrete tanks by the top-loading method as follows:

*9.2.2 Concrete, fibreglass-reinforced polyester, and thermoplastic tanks Strength testing may be performed by either of the following methods:*

*a) vacuum test as specified in Clause 9.2.3; or*

*b) top-loading test as specified in Clause 9.2.4.*

~~9.2.2~~9.2.3 *Vacuum test* ~~*for concrete, extruded polyethylene and polyvinylchloride, and fibreglass-reinforced polyester tanks*~~

*The vacuum* ~~*test for concrete, extruded polyethylene and polyvinylchloride, and fibreglass-reinforced polyester tanks*~~ *shall be conducted as follows:*

*(a) Bed an empty tank in dry sand 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 mm of Hg per metre of the maximum depth of earth cover recommended by the manufacturer. The internal vacuum shall be not less than 50 mm of Hg.*

*(c) Hold the vacuum for 60 ± 5 min. (d) Check for deformation of the tank. Ensure that the hatches and inlet and outlet fittings do not lose their seal or become distorted.*

*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.*

~~*9.2.3 Moulded polyethylene and polyvinylchloride tanks*~~*9.2.4 Top-loading test*

~~*9.2.3.1*~~*9.2.4.1* ~~*Test*~~ *Temperature and duration*

*The strength test* ~~*for moulded polyethylene and polyvinylchloride tanks*~~ *shall be performed at 20 ± 2 °C. The minimum duration shall be 72 h.*

~~*9.2.3.2*~~*9.2.4.2* ~~*Top-loading test*~~ *Procedure*

*The top-loading strength test for* ~~*moulded polyethylene and polyvinylchloride tanks*~~ *shall be conducted as follows:*

Section 9.3, Chamber divider and partition tests: Clarified the fill level required for conducting the test as follows:

*9.3.1 Chamber divider test*

*When a septic tank is compartmentalized, each chamber divider shall be tested as follows after the applicable strength test specified in Clause 9.2 has been conducted:*

*(a) Seal all sides* ~~*of and openings in*~~ *where the chamber divider(s) meets the edge of the tank.*

*(b) Fill* ~~*the*~~ *a septic compartment with water* ~~*to the working liquid level of the tank*~~*. to the applicable invert (i.e., the lowest opening in the divider that allows the movement of water to the next compartment), as follows:*

*i) inlet device described in Clause 4.2.8 f) i); or*

*ii) divider openings described in Clause 4.2.8 f) ii).*

*(c) Ensure that the water depth in the other compartments does not exceed 100 mm.*

*(d) Maintain the water levels specified in Items (b) and (c) for not less than 10 min* ~~*and then check the chamber divider(s) for structural integrity*~~*.*

*(e) Repeat Items (c) and (d)* ~~*for the other compartments*~~ *for each chamber divider the tank could have.*

*(f) Drain the entire tank and check the chamber divider(s) to ensure that it is in its original working order and is structurally sound.*

*The watertightness test specified in Clause 9.4 may be conducted during or after the chamber divider test.*

*Notes:*

*(1) For Items (b) and (c), the water level may be maintained by adding water or pumping.*

*(2) Precautions should be taken to prevent injury caused by unforeseen occurrences such as sudden structural failure.*

Section 9.6, Environmental stress crack resistance test: Added the requirement to conduct the environmental stress crack test on tanks made of polypropylene, and injection-moulded polyolefin materials as follows:

*Stress crack resistance for polyethylene, polypropylene, and injection-moulded polyolefin thermoplastic tanks shall be at least 150 h when measured in accordance with ASTM D1693. Alternatively, the stress crack resistance for polyethylene tanks shall be determined as follows:*

10 Markings and instructions: Added a requirement to mark or label with the allowable installation conditions as follows:

*10.1 Type and location*

*Tanks shall be legibly and permanently marked or labelled as specified in Clause 10.2. Markings or labels shall be located on the top of the tank near the access opening or at the end of the tank near the inlet. In addition, the inlet and outlet shall be marked to indicate the direction of flow.*

*10.2 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 ~~chambers,~~ septic chamber or septic tank expressed in litres;*

*(d) the volume of the ~~chamber(s)~~ 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 ~~with~~ tank for siphon applications (ES); and*

*(f) effluent ~~chamber with~~ tank for pump applications (EP).*

*(f) the maximum burial depth for which the tank is designed, expressed in metres;*

*~~g) the liquid depth of the septic tank if less than 1200 mm, expressed in millimetres;~~*

*~~(h)~~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"; and*

*h) the allowable installation conditions.*

*~~(i)~~ Notes:*

*1) The following is a list of examples of installation conditions, as applicable:*

*a) "above-ground installation not permitted"* or "AGINP"†, where applicable.*

**The equivalent French wording is "installation hors sol interdite".*

*†The equivalent French wording is "IHSI".*

*b) "above-ground installation permitted"* or "AGIP"t.*

*** The equivalent French wording is "installation hors sol permise".*

*t The French equivalent is "IHSP".*

*2) The marking or label for Item d) may be substituted with a volume-height chart or table that can be affixed to the inside of the tank or riser. The chart or table can be printed on weatherproof paper or can be placed in resealable weatherproof packaging.*

*3) Where the volume is expressed in gallons in addition to litres, the unit of measure may be specified as either Imperial gallons or U.S. gallons, as applicable.*

*4)~~Note:~~ The following is an example of a marking:*

*ABC 10 1800 S75 1 1000 SUL AGINP*

*where*

*ABC = manufacturer's name or trademark*

*10 = year of manufacture*

*1800 = working capacity, L*

*S75 = septic tank with siphon, 75 L flush volume*

*1 = maximum burial depth, m*

*1000 = liquid depth, mm*

*SUL = suitable for sulphate soil*

*AGINP = above-ground installation not permitted*