



Drainage Systems Under the Ontario Building Code



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Pipe products that do not meet the Ontario Building Code (OBC) are being promoted to engineers and contractors across the province of Ontario on a regular basis. Similarly, pipe products that do not meet the National Plumbing Code of Canada (NPC) are also being promoted across the country. Engineers occasionally unwittingly specify products that do not meet OBC requirements. These, in turn, are installed by contractors. Both the engineer and contractor are placing themselves in a position of risk by violating the building code. In particular, the engineer could be subject to disciplinary action by the Professional Engineers of Ontario (PEO). Ignorance of a code is not a defense as far as the PEO is concerned.

Where does the building code apply?

The OBC applies to buildings. Section 1 of Ontario's Building Code Act, 1992 states:

In this Act building means,

- a structure occupying an area greater than 10 m² consisting of a wall, roof, and floor, or any of them, or a structural system serving the function thereof, including all plumbing, works, fixtures, and service systems appurtenant thereto;
- a structure occupying an area of 10 m² or less that contains plumbing, including the plumbing appurtenant thereto;
- plumbing not located in a structure;
- a sewage system; or
- structures designated in the building code.

Plumbing under the OBC includes a drainage system. This comprises an assembly of pipes, fittings, fixtures, and appurtenances on a property used to convey sewage and clear water waste to a main sewer or a private sewage disposal system. A drainage system also includes a private sewer, but not a subsoil drainage piping, which is installed underground to intercept and convey subsurface water, and includes foundation drain pipes (e.g. perforated underdrains).

Pipe materials meeting the building code

Section 7.2.5.3. of the OBC states concrete pipe shall conform to CSA A 257 Series, Standards for Circular Concrete Pipe and Manholes. It also states precast reinforced circular concrete manhole sections, catch basins, and fittings shall conform to CSA A 257.4, Precast Reinforced Circular Concrete Manhole Sections, Catch Basins, and Fittings. Concrete pipe and manholes produced in Ontario by the members of the Ontario Concrete Pipe Association meet the requirements of the Ontario Building Code for drainage systems.



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Section 7.2.5.10. of the OBC states plastic pipe and fittings used underground, outside a building, or under a building in a drainage system shall be certified to:

- CAN/CSA-B 182.1, Plastic Drain and Sewer Pipe and Pipe Fittings;
- CAN/CSA-B 182.2, PVC Sewer Pipe and Fittings, (PSM Type);
- CAN/CSA-B 182.4, Profile (Ribbed) PVC Sewer Pipe and Fittings;
- CAN/CSA-B 182.6, Profile Polyethylene Sewer Pipe and Fittings; or
- CAN/CSA B 182.7, Multi-layer PVC Sewer Pipe (PSM Type) having Reprocessed-Recycled Content.

Plastic pipe shall have a stiffness equal to or greater than 320 kPa. Additional CSA standards for plastic pipe are referenced in the OBC, but for clarity's sake, only standards primarily used for drainage are listed here.

It is important to highlight some key points in regard to plastic pipe:

- only plastic pipes produced to CSA standards are allowed, except for acrylonitrile-butadiene-styrene (ABS) pipe produced to ASTM F 628, Standard Specification for Acrylonitrile-butadiene-styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core;
- high-density polyethylene (HDPE) pipe produced to American Association of State Highway and Transportation Officials (AASHTO) and ASTM standards are not allowed;
- all plastic pipe must be certified by a testing agency accredited for that purpose by the Standards Council of Canada;
- all plastic pipe must have a minimum pipe stiffness of 320 kPa; and
- HDPE pipe produced to CSA B182.8, Profile Polyethylene (PE) Storm Sewer and Drainage Pipe and Fittings, does not meet the OBC.



These PVC Pipes are certified to CSA B182.4 with a pipe stiffness of 320 kPa and comply with OBC requirements.

Section 7.2.6.8 of the OBC states corrugated steel pipe and couplings shall be certified to CSA G 401, Corrugated Steel Pipe Products. Corrugated steel pipe must be certified by a testing agency accredited for that purpose by the Standards Council of Canada.

However, Section 7.3.6.2. Tests of Pipes in Drainage Systems states: "Every pipe in a drainage system, except an external leader or fixture outlet pipe, shall be capable of withstanding without leakage a water test, air test and final test" and, Section 7.3.6.4. Water Tests in Drain, Waste and Vent Systems states: "Where a water test is made, all joints shall be tested with a water column of not less than 3 m... the system or the section shall be kept filled with water for 15 min".

Corrugated steel pipe produced in accordance with CAN G401 Corrugated Steel Pipe Products does not meet the leakage requirements of the OBC. In fact no hydrostatic testing is included in CAN G401, unlike standards for reinforced concrete pipe, PVC pipe and HDPE pipe. Hydrostatic tests have been attempted in the past using CSP but with dismal results. Leaky joints result in infiltration and exfiltration and over time will result in sinkholes or a complete failure of the pavement overhead. Failures of this nature pose safety risks, traffic disruption and can impact property values.

Protecting yourself under the building code:

I delivered a presentation entitled "Protecting Yourself as a Gravity Pipe Designer" at an infrastructure seminar in Toronto. The audience included representatives from




the various pipe industries. It became apparent during that presentation that some attendees were not as well informed as they should be on piping related issues. One senior representative from a pipe company seemed vague on his understanding of the differences between third party certification and conformance to a specification. Another thought International Organization for Standardization (ISO) registration and third party certification were the same thing. In fact, they are very different. ISO registration does not meet the OBC's requirement of 'certified.'

Following the presentation, several questions lingered in light of the audience's lack of knowledge. How informed is the typical pipe salesperson on these issues when senior management does not appear to understand the concepts? A salesperson's job is to sell pipe. A professional engineer's job includes designing infrastructure in accordance with applicable codes that will perform its intended purpose throughout its project life. Sometimes those goals can be mutually exclusive. It is critical the professional engineer receive more information from a pipe salesperson's visit than just a canned sales pitch. The following are sample questions to ask all pipe salespeople whose products may be included in a drainage system covered by the OBC:

1. Do all of your company's pipe products offered for sale in Ontario meet the OBC?
2. Which products offered for sale in Ontario do not meet the OBC? Explain.
3. Must your products be certified by a testing agency accredited for that purpose by the Standards Council of Canada?
4. May I have a copy of your certification program protocol?
5. What specifications regulate the manufacturing of your products?
6. Do all of your plastic pipe products for drainage systems have a minimum pipe stiffness of 320 kPa as required by the OBC?
7. Do your products meet the leakage requirements of Section 7.3.6.2 and Section 7.3.6.4.

If the salesperson appears vague or unsure of the answers, the professional engineer needs to do his or her due diligence. It is always a good idea to get specific answers in a letter signed by a professional engineer employed by the pipe company.

If engineers responsible for designing, constructing, and inspecting drainage systems in accordance with the OBC included these recommendations in their due diligence, then all parties involved, including the project owners and the public, would be better served. 

Canada's Building Regulations

The Constitution Act gives provinces and territories the primary responsibility for building regulations in Canada, except for federal government buildings, buildings housing federally regulated industries, and aboriginal lands.

The provinces and territories work with the National Research Council (NRC) to develop and publish model building, fire and plumbing codes that they can adopt as their own. The Yukon, Northwest Territories, Nunavut, Nova Scotia, New Brunswick, Québec, Manitoba and Saskatchewan have adopted the National Building Code of Canada (NBC) as their own provincial or territorial code. British Columbia and Alberta have also adopted this code, but changed the name to the British Columbia Building Code (BCBC) and the Alberta Building Code (ABC) respectively. Prince Edward Island and Newfoundland do not have province wide building codes but require their major municipalities to use the NBC. The federal government requires conformance with the National Building Code.

Ontario is the only provincial jurisdiction that publishes its own building code. Although based on the National Building Code, about 10 per cent of the OBC is different. However, Ontario has stated a commitment to work with the other provinces and territories to move towards greater harmonization.