PVC VS. POLYPROPYLENE (PP) SANITARY SEWER PIPE:

PROVEN PERFORMANCE MAKES PVC THE BETTER CHOICE FOR CANADA

PVC sewer pipe has demonstrated proven performance in Canada's often-challenging conditions. PVC is used in over 85% of new installations, making it the material of choice for sanitary sewers. Since solid-wall PVC sewer pipe is the benchmark by which other pipe types are measured, information on this product has been included along with profile-wall PVC and PP pipes.

PVC Pipe – Long-Term Performance

Almost fifty years of unsurpassed reliability in sanitary sewer applications around the world is backed by CSA's PVC sewer pipe standards that include CSA B182.2 (since 1983), CSA B182.7 (first published in 1997 and incorporated into B182.2 in 2011), and B182.4 (also since 1983). By contrast, the PP standard B182.13 was first published in 2011.

Stringent Acceptance Tests

- Deflection Mandrel Testing
  - PVC pipe: CSA specifies mandrels that allow no more than 7½% deflection of the PVC pipe diameter – which provides a high safety factor against buckling.
  - PP pipe: CSA does not provide guidance on allowable deflection of PP pipes. Since PP profile-wall pipes may have reduced deflection capabilities, designers should specify lower allowable deflection to ensure the same degree of safety.
- Air Testing
  - General: the CSA B182.11 standard for installation of thermoplastic non-pressure pipes includes low-pressure air testing. As a result of testing and research done since the 1950s, Uni-Bell's UNI-B-06 "Recommended Practice for Air Acceptance Testing of Sewer Pipe" has become the industry's guideline. However, the CSA standard's test does not measure up to UNI-B-06 for ensuring system tightness.
  - PP pipe: PP has a 57% lower modulus of elasticity than PVC and PP is more prone to creep. As a result, typical low-pressure air testing may not give adequate assurance of long-term PP joint tightness.
- Final Acceptance: Utilities often specify minimum waiting periods of 30 days before final acceptance of newly installed sewer pipes.
  - PVC pipe – this deflection-versus-time testing is a proven method of ensuring proper design and installation of PVC pipe systems – verified by over 40 years of research and field experience.
  - PP pipe – until comparable testing and field evaluation are completed for PP pipe, users should not assume that mandrel and low-pressure air tests for PP provide the same assurance of installation quality as they do for PVC. It is recommended that PP lines be retested after one year to verify structural reliability (deflection mandrel test) and joint integrity (air test).

Other Considerations

- Fittings: Unlike PP systems, PVC sewer pipe has a wide assortment of fittings available from many manufacturers. Joints using PVC fittings meet the same high performance requirements, since pipe joints and systems can easily be designed without the need for fittings that require cutting holes into the pipe. Sanitary sewer system water-tightness is achieved by avoiding cut-in fittings.
- Challenging Design Applications: For difficult installations — where factors are present such as deep burial, poor soils, and high water tables — PVC pipe offers heavy-wall (higher-stiffness) pipe, as well as higher-stiffness and deep-socket fittings, which is not the case for PP.
- Polypropylene Pipe – Caution Advised: The recent introduction of PP into the sanitary sewer market should be cause for concern to wastewater utilities for the following reasons:
  - Unsupported claims about performance
  - Lack of rigorous studies and testing
  - Questions regarding joint integrity
  - Reduced safety factors

PVCPIPE association
Uni-Bell PVC Pipe Association | 2711 LBJ Freeway, Suite 1000 | Dallas, TX 75234
Phone: (972) 243-3902 | Fax: (972) 243-3907 | info@uni-bell.org

PVC VS. POLYPROPYLENE (PP) SANITARY SEWER PIPE:

PROVEN PERFORMANCE MAKES PVC THE BETTER CHOICE FOR CANADA

Sanitary sewer utilities should require piping products that have a proven track record of performance. As municipalities and design engineers attempt to reduce costs, consideration should be given to some of the significant differences between PVC and PP pipe materials.

The table below compares solid-wall PVC pipe, profile-wall PVC pipe, and profile-wall PP pipe.

Pipe Stiffness 320 kPa				
	Solid-Wall PVC	**Solid-Wall Three-Layer PVC**	**Profile-Wall PVC**	**Profile-Wall PP**
Material	PVC	PVC with Recycled PVC Center Layer	PVC	PP
Standard	B182.2	B182.2 (was B182.7[1])	B182.4	B182.13
Year First Published	1983	1997	1983	2011
Tensile Strength, Min. (MPa)	41.4	34.5 (center layer[2])	41.4	24.0
Modulus of Elasticity, Min. (MPa)	2760	1930 (center layer[2])	2760	1200
300mm Pipe Wall Thickness, Min. (mm)	9.07	9.07	N/A	1.38
750mm Pipe Wall Thickness, Min. (mm)	23.22	23.22	3.30	1.80
300mm Pipe Impact Resistance, Min. @ 0°C (j)	205	205	N/A	205
750mm Pipe Impact Resistance, Min. @ 0°C (j)	300	300	250	250
Flattening Test, Min. % Deflected	60%	60%	60%	60%
Profile-Wall Quality Control Air Test for Seams?	N/A	N/A	Yes	Yes
Recommended Max. Diametric Deflection (%)	7.5	7.5	7.5	None
Base ID (mm) Recommended?	Yes	Yes	Yes	Yes
Deflection-Test Mandrel Size Recommended?	No	No	No	No
Gasketed Joints Require ASTM D3212?	Yes	Yes	Yes	Yes

Notes:
[1] B182.7 was incorporated into B182.2 in 2011
[2] Inner and outer layers have same minimum properties as solid-wall PVC

Additional Information Not Found in Standards				
	Solid-Wall PVC	**Solid-Wall Three-Layer PVC**	**Profile-Wall PVC**	**Profile-Wall PP**
Manning's "n" for Hydraulic Design	0.009	0.009	0.009	0.012
Diametric Deflection Before Buckling (%)	30+	30+	Not Known	Not Known
Full-Bodied Fittings	Full line	Full line	Full line	Partial line

PVCPIPE association
Uni-Bell PVC Pipe Association | 2711 LBJ Freeway, Suite 1000 | Dallas, TX 75234
Phone: (972) 243-3902 | Fax: (972) 243-3907 | info@uni-bell.org
04.26.16