

## Know the Facts: Why you should specify RCP (Reinforced Concrete Pipe) over Polypropylene Pipe

	Polypropylene Pipe (PP)	Reinforced Concrete Pipe (RCP)
<b>Joint Integrity</b>	<b>PP – Claim:</b> Extended Bell and Spigot joint with standard rubber gasket exceeds 25 feet of head pressure per ASTM-D-3212	<b>RCP – Fact:</b> ASTM-D-3212 clearly expresses in its section 1.1 “This specification covers joints for plastic pipe systems intended for drain, and gravity sewerage pipe at internal or external pressures less than 25 foot head using flexible watertight elastomeric seals.” or 10.8 psi. In contrast ASTM-C-1628 in section 9.2.1.1 “hydrostatic pressure to 13 psi” (30 feet of Head Pressure) for Reinforced Concrete Pipe.
<b>Maximum Cover</b>	<b>PP – Claim:</b> Range of installation depths up to 39 feet of fill.	<b>RCP – Fact:</b> When class V pipes are specified, and/or special design pipes are analyzed by the direct design method, RCP is capable of greatly exceeding 39 feet of fill height. Design depths for RCP over 50 feet are possible and not that uncommon. A 30” RCP CL-V pipe is specified for 53 feet of fill on Resource #16-201 published by the ACPA. RCP has been designed for fill heights up to 150 feet of fill. It should also be noted that PP’s claim for 39 feet of fill has some significant exceptions, including, calculations assume no hydrostatic pressure and a density of 120 pcf (1926 kg/m <sup>3</sup> ) for overburden material. Additionally, PP installation is assumed to be in accordance with ASTM D2321. Material must be adequately “knifed” into haunch and in between corrugations. Compaction and backfill material is assumed uniform throughout entire backfill zone.
<b>Minimum Cover Height</b>	<b>PP – Claim:</b> 95% SPD Class III Backfill – 1.0 foot (See technical note 2.04)	<b>RCP – Fact:</b> AASHTO LRFD Bridge Design Specification Section 12 Table 12.6.6.3-1 requires a minimum of 2 feet of cover under a roadway for thermoplastic pipes.
<b>Installation Rate</b>	<b>PP – Claim:</b> 200 feet/day per RS Means	<b>RCP – Fact:</b> Any experienced contractor will tell us that the controlling factors on pipe installation rates are the depth of excavation, foundation preparation, soil types, compaction of the pipe envelope, trench box removal and final backfill. Flexible pipes require wider trench widths and extra care when removing the trench box in order to prevent loss of support along the sides of the pipes. The pipe material itself has a minor influence on the installation rates. Contractors have been consistently indicating that due to the light weight of thermoplastic pipes, the compaction efforts for the pipe envelope is taking significantly longer times for these very light weight pipes, particularly when following the manufacturer’s installation recommendations of 4” to 6” soil compaction lifts. Maintaining line and grade with these very light weight pipes requires a significant degree of extra-care. In addition, installation recommendations from the manufacturers of PP pipe requires that the soil be “knifed” in between every corrugation. An 18” diameter x 200 feet long pipeline will require ~3,600 “knifing” actions per manufacturer requirement. Also the following additional requirements for the utilization of a trench box will have a significant effect on the installation rates. While trench boxes increase worker safety in difficult site conditions, their use requires some precautions be taken to ensure a structurally sound finished installation. Construction of a sub-trench is the most effective means of maintaining a sound system; the trench box can simply be pulled along the top edge of the sub-trench. When a regular trench is used, techniques such as lifting the box, keeping the box about three-fourths the nominal pipe diameter up from the trench bottom, and providing a wide granular backfill envelope will help provide a quality installation.

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<b>Allowable Backfill</b>	<b>PP – Claim:</b> Based on installation requirements, Class I, II, III or IV backfills may be used. High plasticity soils (MH, & CH) are not recommended (See ASTM-D-2321)	<b>RCP – Fact:</b> ASTM-D-2321 relative to CL-IV materials; “Properly placed and compacted, Class IV materials can provide reasonable levels of pipe support; however, these materials may not be suitable under high fills, surface-applied wheel loads, or under high-energy-level vibratory compactors and tampers. Do not use where water conditions in the trench may prevent proper placement and compaction.” In other words, can not be used underneath a roadway.
<b>Number of Joints</b>	<b>PP – Claim:</b> 9 joints per 200 linear feet of pipe (based on 20 feet standard pipe length,”) )	<b>RCP – Fact:</b> Reality is that most utility contractors can not efficiently install 20 feet joints. Experience dictates that 8 to 12 foot joints are the most prevalent size due to excavation equipment limitations and trench box weights.
<b>Product Weight</b>	<b>PP – Claim:</b> 370 pounds per 20 feet stick of pipe.	<b>RCP – Fact:</b> For most jobs the difference in weight is not a factor, relative to the equipment. The piece of equipment that digs the trench for a 30 inch diameter pipe is large enough to handle either pipe material, because the equipment size is dictated by the excavation requirements and trench boxes. In addition, a pipe material that weights ~ 19 pounds per foot, becomes very unstable under the effect of high power compaction equipment capable of imparting thousands of pounds force energy. For a 20 foot joint a contractor will need a 24 foot long trench box shield. The trench box shield will need to be lifted every 6” lifts up to an elevation of 12” above the pipe crown. These larger size trench boxes may dictate the use of larger capacity excavation equipment.
<b>Corrosion Resistant</b>	<b>PP – Claim:</b> Unaffected by salts, most chemicals, and “hot” soils.	<b>RCP – Fact:</b> Thermoplastic materials are susceptible to temperature changes that affect the pipe prior to, during and after installation. Oxidation is a growing concern for many thermoplastic pipe materials. Thermoplastic pipes are also susceptible to a phenomenon known as slow crack growth that affect its expected service life.
<b>Design Service Life</b>	<b>PP – Claim:</b> 100 years	<b>RCP – Fact:</b> The DOT requires stringent installation standards and Post-Installation Inspection to ensure the pipe material is installed appropriately with limited deflection. A flexible pipe installed with limited inspection and no control of over-deflection would not be considered to have the same Design Service Life per DOT installation standards. In addition, a special testing protocol is demanded by the DOT in order to qualify any thermoplastic pipe for 100 year service life.

