

BWP vs HDPE Pipe Comparison

Bar Wrapped Cylinder Concrete Pipe has been manufactured in the United States since the 1940's. BWP is generally available in sizes from 10 to 72 in. and is supplied in 24 to 30 ft. lengths. Applications for this product include transmission mains, distribution feeder mains, water intake and discharge lines, pressure siphons, low-head penstocks, industrial pressure lines (including power plant cooling-water lines), subaqueous lines (into both fresh water and salt water), and spillway conduits. projects.

This document is a comparison between BWP and HDPE utilizing information available from industry standards and resources. It is intended to differentiate key performance attributes of the materials to assist specifiers in product selection for water and wastewater pipelines.



ITEM	BWP	HDPE
Pipe Standards	<ul style="list-style-type: none"> • AWWA C303 - Concrete Pressure Pipe, Bar Wrapped Steel-Cylinder Type • AWWA M9 – Concrete Pressure Pipe 	<ul style="list-style-type: none"> • AWWA C906 – Polyethylene Pressure Pipe and fittings 4"-65" for Waterworks • AWWA M55 – PE Design and Installation
Service life	² Estimated service life of 75-105 years.	⁶ Estimated service life of 50-100 years.
Pipe Strength/Stiffness	The pipe stiffness range for 36" is from 540 psi to over 1500 psi.	The maximum pipe stiffness for 36" ranges from 23 psi (DR26-80 psi pressure rating) to 357 psi (DR11- 200 psi pressure rating).
Pressure and Diameter Range	<ul style="list-style-type: none"> • Typical diameters range from 10" through 72", although larger diameters may be available.¹ Bar Wrapped cylinder concrete pipe has been designed for operating pressures greater than 400 psi • Actual inside diameter consistent nominal diameter. 	<p>Maximum pressure class (PC) vary by diameter</p> <ul style="list-style-type: none"> • DR21 = 14" (350mm) to 60" (1500mm) = 100psi • DR17 = 14" (350mm) to 60" (1500mm) = 125psi • DR13.5 = 14" (350mm) to 48" (1200mm) = 160psi • DR11 = 14" (350mm) to 36" (850mm) = 200psi • DR9 = 14" (350mm) to 30" (750mm) = 250psi • DR7 = 14" (350mm) to 24" (600mm) = 335psi <p>Actual internal diameters significantly smaller than nominal pipe diameters. Larger pipe diameter may be required.</p> <p>DR = Dimension ratio</p>
Negative Pressures	No special design considerations required for full vacuum or external pressure.	Susceptible to collapsing from any vacuum
Bedding and Backfill Requirements	Minimal bedding is required, and native soils can be used as bedding material.	<ul style="list-style-type: none"> • More oversight of bedding material required • Significantly more backfill, compaction and oversight required
Contaminated Soils (Hydrocarbons)	<ul style="list-style-type: none"> • Product is not permeable • Only gasketed sections of pipeline need to be addressed for performance 	<ul style="list-style-type: none"> • Product is permeable to gasoline contaminated soils³ • Not suitable for potable water applications in the presence of hydrocarbons³
Pressure Tapping	Procedure has more predictable behavior	Flexibility of pipe requires significant care when tapping.
Restraint Options	<ul style="list-style-type: none"> • Mechanical restraint option utilizing Snap-Ring, Holdfast and/or Harness Clamp restraints for most pressures and diameters. • Welded joints available for all pressures and diameters. 	<ul style="list-style-type: none"> • Fused joints require extra time for the fusion welding process. Long sections of open trench for extended periods of time are needed for installation. • Specialized equipment required for fused joints. • Expansion and contraction of pipe prior and during installation must be considered.
Thermal Coefficient of Expansion	<ul style="list-style-type: none"> • 4.1 to 7.3 x 10⁻⁶ in/in – F / 7.4 to 13 x 10⁻⁶ m/m – C (values for portland cement concrete) • Longitudinal contraction is not a major concern 	<ul style="list-style-type: none"> • 9 x 10⁻⁵ in/in/°F⁵ • Thermal expansion is 1 inch per 10⁹ F for 100 feet of pipe. • Longitudinal contraction needs to be carefully considered for flanged connections⁵

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Buoyancy	More suitable for saturated ground conditions due to inherent weight of pipe	Susceptible to floatation in saturated ground conditions
Product Support	Pipe supplied direct from manufacturer along with OEM engineering and field service support	Pipe typically supplied through distribution chain with limited engineering and field service support
Special Circumstances	<ul style="list-style-type: none">• Heat/flame resistant• Hydrocarbon resistant gaskets available (Nitrile)	<ul style="list-style-type: none">• Not flame resistant, susceptible to damage from flames/excess heat• Pressure derating at 80°F

REFERENCES

¹ Concrete Pressure Pipe AWWA MANUAL M9 – 3rd Edition, American Water Works Association.

² American Water Works Association (AWWA) (2015). "Buried No Longer: Confronting America's Water Infrastructure Challenge."

³ American Water Works Association Research Foundation (AWWARF) (2007). "Impact of Hydrocarbons on PVC/PE Pipes and Pipe Gaskets" (Ong, et al).

⁴ Plastic Pipe Institute (PPI) https://www.plasticpipe.org/MunicipalIndustrial/Municipal_Industrial/Applications/Potable-Water-Benefits---HDPE.aspx - accessed June-02-2022

⁵ Plastic Pipe Institute (PPI) <https://www.plasticpipe.org/common/Uploaded%20files/Technical/TN-27.pdf> - accessed June-02-2022

⁶ "Key Factors That Influence the Service Life Pe Pipe: Peak Pipes." Peak Pipes | Manufacturers of Polyethylene Pipe, 1 Sept. 2021, <https://www.peakpipesystems.com/key-factors-that-influence-the-service-life-pe-pipe/#:~:text=Typically%20polyethylene%20pipe%20can%20last,designed%2C%20maintained%20and%20installed%20correctly>. accessed Sept-01-2022