

BWP vs PVC Pipe Comparison

First used in the early 1940's, Concrete Bar-Wrapped Steel Cylinder Pipe Type, commonly called Bar-Wrapped Pipe (BWP), combines a water-tight steel cylinder and helically wrapped reinforcing bar, with concrete or mortar lining and coating to produce a high-performance pipe suitable for a wide range of water conveyance applications, such as transmission mains, reclaimed water, industrial, intake and discharge pipelines. It's cement-rich mortar coating electrochemically protects the steel components from corrosion.

This document is a comparison between BWP and PVC 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	PVC
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 C900 • AWWA M23 manual • AWWA C905-10 is now obsolete
Service Life	² Estimated service life of 75 to 105 years	² Estimated service life of 55 to 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 28 psi (DR41-100 psi pressure rating) to 224 psi (DR21- 235 psi pressure rating).
Fittings	<ul style="list-style-type: none"> • Custom fittings configuration and geometry to match customer needs. • Adaptability to all pipe types • Produced domestically by pipe manufacturers. 	<ul style="list-style-type: none"> • Uses Ductile Iron Pipe fittings with external corrosion protection. • Typically Imported • Limited configuration options • Long lead times • Availability of larger diameter fittings is limited • Long radius elbows not available
Design Pressures and Diameter Range	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.	Maximum pressures by diameter: <ul style="list-style-type: none"> • Up to 30" (750mm) – 235-psi • 36" (900mm) – 200-psi • 42" and 48" (1050mm and 1200mm) – 165-psi • 54" and 60" (1350mm and 1500mm) – 50-psi
Negative Pressures	No special design considerations required for full vacuum or external pressure.	Susceptible to collapsing and joint performance issues from surge waves and partial 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. • Installation recommendations conflict with OSHA trench box requirements ³
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"> • Mechanical restraint options provided by third party . • Pressure and Diameter range limitation based on type of restraint.
Corrosion Performance	Integrated cement mortar coating and lining provides protection for pipe and fittings. Supplemental corrosion protection available for adverse environments.	Ductile Iron Pipe fittings and pipe restraints require protection from corrosion.
Pipe Design	<ul style="list-style-type: none"> • Manufacturers provide project specific lay schedule, pipe design and engineered shop drawings. • Project design consultant verifies manufacturers design. 	<ul style="list-style-type: none"> • Manufacturers do not provide project specific lay schedules, pipe designs or shop drawings.
Pressure Tapping	Procedure has more predictable behavior	Potential risk of pipe failure during the tapping process
Buoyancy	More suitable for saturated ground conditions due to inherent weight of pipe	Susceptible to floatation in saturated ground conditions

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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	Heat/flame resistant	<ul style="list-style-type: none"> • Not flame resistant • Pressure derating at 75° F
Impact Resistance	High impact strength	Low impact strength

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 "Trenching Safety Can Compromise Plastic Pipe Performance." CCPPA, 25 Feb. 2021, <https://ccppa.ca/trenching-safety-plastic-pipe-performance/>. - accessed Sept-01-2022