# BWP vs STEEL 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 steel pipe 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 | STEEL PIPE |
|---|---|---|
| **Pipe Standards** | • AWWA C303 - Concrete Pressure Pipe, Bar Wrapped Steel- Cylinder Type<br>• AWWA M9 – Concrete Pressure Pipe | • AWWA C200 – Standard for Steel Water Pipe, 6 IN. and Larger<br>• AWWA C206 - Field Welding of Steel Water Pipe<br>• AWWA C207 – Steel Pipe Flanges<br>• AWWA C208 – Dimension for Fabricated Steel Water Pipe Fittings<br>• AWWA M-11 - Steel Pipe - A Guide for Design and Installation |
| **Service Life** | [1] Estimated service life of 75-105 years. | [1] Depending on lining, coating and cathodic protection may have estimated service life of 70-100 years. |
| **Pipe Strength/Stiffness** | Semi-rigid pipe with significantly higher pipe stiffness than steel pipe therefore requires minimal bedding. | Steel is a flexible pipe low stiffness that relies on support from trench embedment material (E') to prevent exceeding deflection limitation of pipe. |
| **Bedding and Backfill Requirements** | Maximum pipe zone embedment required for Bar Wrapped Pipe is to the springline of the pipe. | Significantly more backfill, compaction and oversight is required for steel pipe. Pipe embedment and compaction required to the crown of the steel pipe. |
| **Hydraulics** | [3] Hazen-Williams C Factor = 139.3+2.028d from AWWA M9 Manual for Concrete Pressure Pipe. | [2] Hazen-Williams C Factor = 140+0.17d for liner in good condition. M11 Manual mentions aggressive C Factor = 130+0.16d in "consideration for long-term liner deterioration, slime build-up , etc" |
| **Gasketed Joints** | Utilizes Carnegie joint with fully confined gasket. The compressed volume of the gasket is designed to fill 100% the recess of the groove when the joint is engaged. | Rolled groove joint has limited size and pressure range. Spigot of pipe have rolled recess as gasket groove. Outside of this range, joints must be welded.<br>[2] Sizing and shape of the rubber gasket and the spigot groove are developed by the manufacturer and are dependent on the configuration of the spigot. |
| **Restraint Joints** | • Mechanical restraint option utilizing Snap-Ring, Holdfast and/or Harness Clamp restraints for most pressures and diameters.<br>• Welded joints available for all pressures and diameters. | • Welded joints are generally the only option for restrained joints for steel pipe.<br>• Temperature control joints required every 400 to 500 feet per AWWA M11 Manual. |
| **Testable Joints** | Double gasketed joint with test port between gaskets. | Double welded joint with test port between welds. |
| **External Corrosion Protection** | Cement Mortar coating provides protection. | Requires barrier or dielectric coatings with the addition of corrosion monitoring system and/or supplemental cathodic protection as a means of corrosion protection. |
| **Long-Term Maintenance** | • Maintenance free<br>• Protected from Corrosion | • Cathodic Protection system requires continuous maintenance and operation cost.<br>• High energy cost for cathodic protection. |


REFERENCES
[1] American Water Works Association (AWWA) (2015). "Buried No Longer: Confronting America's Water Infrastructure Challenge."
[2] Steel Pipe - A Guide for Design and Installation AWWA MANUAL M11 – 5th Edition, American Water Works Association.
[3] Concrete Pressure Pipe AWWA MANUAL M9 – 3rd Edition, American Water Works Association.



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