

# BAR-WRAPPED CONCRETE CYLINDER PIPE - AWWA C303

## THE STRENGTH OF STEEL PARTNERED WITH THE CORROSION PROTECTION OF CONCRETE

Bar-Wrapped Concrete Cylinder Pipe (CCP) combines a steel cylinder lined with cement mortar, reinforced with helically wrapped mild steel bar, and coated with dense cement mortar. It unites the inherent strength of steel and the passivating characteristics of cement-mortar linings and coatings for long-term protection against corrosion. Since its introduction in 1942, more than 10,000 miles of CCP piping system have been installed across the Nation.

CCP is designed and manufactured in accordance with the American Water Works Association (AWWA) Standard C303 and AWWA Manual, *M9 Concrete Pressure Pipe, Third Edition*. It is supplied in standard diameters of 18 to 72 inches for operating pressures up to 400 psi, but can be manufactured in larger sizes and for higher pressures based on the concept of this standard. Principle use is the transmission and distribution of water in municipal, industrial, and agricultural systems. CCP is often used to convey seawater and sewage in force mains.

### Designed for Cost Efficiency and Flexibility

**Rapid Installation** - CCP's long laying length combined with the self-centering steel bell and spigot joint support rapid and economical installation. With each project, we number all pipe and fittings to identify their location in the pipeline and reduce field downtime.

**Reliable Joints** - The single rubber gasket joint is the standard in durability and reliability. Since the introduction of CCP, this economical joint has provided solid field performance.

**Proven Carrying Capacity** - Field studies demonstrate undiminished flow capacity over project service life.

**Customized Pipeline Design** - With each project, Northwest Pipe manufactures all components to specifications. We provide a complete engineering package with pipe design calculations, layout drawings, and fabrication details for each component.

**In-Service Field Pressure Tapping** - CCP can be economically tapped while in service with commercially available equipment and procedures, allowing the installation of a full range of outlets in any diameter pipe.

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## Hydrostatic Design

The average circumferential stress in the steel cylinder and bar reinforcement of the pipe at design pressure is limited to 36,000 psi, the specified minimum yield strength of the steel used in the cylinder. The actual yield strength of the steel used to manufacture the cylinders is typically greater than 36,000 psi, resulting in an actual safety factor greater than 2 to 1 in the equation.

The required circumferential steel area for a given diameter and pressure class of pipe can be provided by several combinations of steel cylinder thicknesses, and bar diameters and spacing.

Standard designs for CCP are based on a safety factor of 2.0 and a minimum yield of 36,000 psi for the steel and are available through your sales associate. The standard designs provide an allowance for transient pressure 1.5 times the design pressure in the pipe.

## External Loads

External loads of buried CCP pipelines are resisted by the ring flexural strength of the pipe (stiffness) and by the passive lateral earth pressure on the sides of the pipe. The composite wall construction contributes significantly to its rigidity and external load carrying capacity. Our engineers can help determine your project's specific pipe design based on pressure and earth cover load as well as recommended bedding and back filling procedures.

## Exceeding National Standards

Northwest Pipe Company is committed to providing quality products and services to our customers. We achieve this through continually monitoring and improving the performance of our quality management systems and objectives in association with customer needs. Adhering to the national standard of AWWA C303, our company maintains a quality assurance program and conforms to the American Society for Testing and Materials (ASTM) standards. These nationally-recognized standards ensure quality assurance checks are completed at every manufacturing process, and that our manufacturers, fabricators, and welders are properly trained.



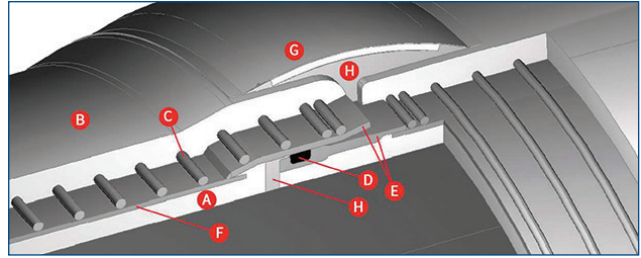
ISO 9001  
Certificate No. 33609

Northwest Pipe Company has a multi-site certificate of conformance (No. 33609) for ISO 9001:2015 for the design and manufacturer of welded, bare, lined, and coated steel pipe and fittings.

## Support at Every Step

With sales staff and manufacturing facilities located strategically across North America, we are positioned to provide support and prompt delivery to even the most remote job sites. Our service team works closely with public agencies, contractors, and engineering firms to provide technical support, training, and information on material selection. With coast-to-coast experience, and an understanding of regional conditions and regulations, we will partner with your team to set a manufacturing time-line that meets designated milestones.

## Composite Structure Features



- A Concrete or Cement Mortar Lining
- B Dense Cement Mortar Coating
- C Bar-wrapped Reinforcement
- D Round Rubber Gasket
- E Steel Joint Rings
- F Steel Cylinder
- G Polyethylene Foam-lined Grout Band
- H Field-applied Cement Mortar

## Special Pipe and Fittings

Northwest Pipe can fabricate virtually any shape or size of specialty pipe or fittings conforming to the applicable sections of AWWA Standards C303 and C208. Our independently certified in-house technicians design and manufacture steel fittings and special pipe including short lengths, beveled ends, manholes outlets, air valves, blowoffs, and other connections. Fittings include elbows, reducers, and connections to mainline valves and appurtenances. These are fabricated from steel plate or sheet and cement mortar, lined and coated. And every pipe order is delivered in proper sequence for quick installation in the pipeline.