

ANSI/AWWA **C622-19**
(First Edition)

AWWA Standard

Pipe Bursting of Potable Water Mains 4 In. (100 mm) to 36 In. (900 mm)

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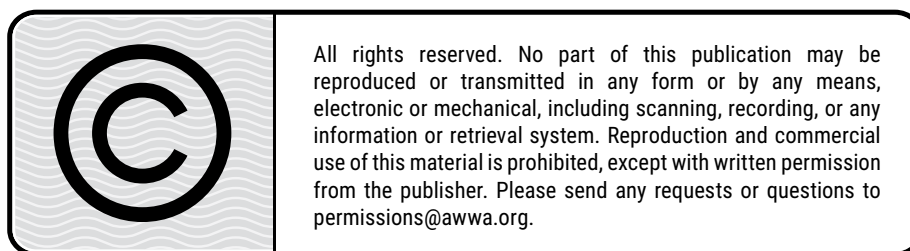
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Foreword

This foreword is for information only and is not a part of ANSI /AWWA C622.*

I. Introduction.

I.A. *Background.* Pipe bursting is a trenchless process for replacing an existing pipeline with a new pipeline and is a well-established trenchless method of pipeline replacement that has been in use in the United States for several decades. The process was first developed in the United Kingdom in the late 1970s for replacing natural gas pipelines without having to excavate a trench for the entire existing alignment. The pipe bursting process is a form of pipeline rehabilitation that replaces the original pipe with a new pipe that is the same or larger diameter. The new pipeline is a fully functional pipe replacement method. In the United States, the technology was modified and used to replace water and wastewater pipelines. Existing water mains of sizes between 4 in. (100 mm) in diameter to 36 in. (900 mm) in diameter have been successfully pipe burst.

The pipe bursting process consists of either a pneumatic (air powered) or static (hydraulically powered) pipe bursting system that fractures or splits the existing water main while simultaneously expanding the surrounding soils and installing a replacement pipe of equal or larger diameter. A static (hydraulic) pipe bursting system uses rods that are pushed into the existing water main then attached to “roller cutters” (as needed depending on the host pipe material) and an expander, which pulls a new pipe through during the process. The pipe bursting tool is designed to utilize the existing pipeline as a guiding alignment for the replacement pipe. The bursting tool moves through the existing pipe while fragmenting or splitting the existing pipe and pushing the original pipe materials into the surrounding soil as the tool, expander, and replacement pipe progress. The expander, which is attached to the new pipe being pulled through, is slightly larger in outside diameter than the new pipe. This allows a small temporary annulus to be created between the replacement pipe and surrounding soil. The annulus created is dependent on the type of soil surrounding the existing pipe. Depending on the original methods and materials used for installation of the existing pipe, compressible pipe backfill materials such as sandy or loamy soils in the existing trench section may also aid in expanding the areas around the water main to create an annulus. Pipeline materials that can be burst include the following: plastic, ductile iron, cast iron, steel, steel reinforced concrete, high-density polyethylene (HDPE), polyvinyl chloride (PVC), asbestos cement, and fiberglass. Fracturable pipe materials

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such as cast iron, asbestos cement, thin-walled plastic/PVC, and fiberglass can be pneumatically pipe burst. Nonfracturable pipe materials such as ductile iron, steel, reinforced concrete, thick-walled PVC, and HDPE generally require and are best suited for the static (hydraulic) pipe bursting method.

In static (hydraulic) pipe bursting, pull force is applied to the expander through steel pulling rod assemblies inserted through the existing pipe. The expander transfers the horizontal pulling force into a radial force that breaks the existing pipe and expands the cavity, providing space for the new pipe. With the rod method, steel rods are inserted into the existing pipe from the pulling shaft (receiving pit). When the rods reach the insertion pit, the bursting head is connected to the rods and the new pipe is connected behind the expander. Typically, a hydraulic power pack unit powers the equipment pulling the rods. The pulled rod sections are removed as the pipe progresses. The expander and the new pipe are pulled through the fractured existing pipe. The process continues until the bursting head reaches the receiving pit, where it is disconnected from the new pipe.

Static (hydraulic) pipe bursting technology includes the “pipe splitting” method through the addition of a “splitter” in front of the pipe burst expander head that splits the existing pipe. Properly designed and manufactured roller blade cutting wheel assemblies allow bursting of nonfracturing types of pipe such as steel and ductile/cast iron water pipes, concrete, and HDPE as well as some repair clamps or fittings that may be on the pipeline. Static systems can pull in all types of new pipe materials including fusible PVC, restrained joint PVC, plastic pipe, HDPE, and restrained joint ductile iron pipe.

The pneumatic pipe bursting system has a bursting tool that is a soil-displacement hammer driven by compressed air. An expander is attached to the front of the pneumatic hammer for “reversible tools” or on the back of the pneumatic hammer for a rear flair tool, depending on soil conditions and any upsizing requirements. The pneumatic hammer assembly is launched into the host pipe via the entry excavation. The bursting tool is connected to a constant-tension, variable-speed winch cable that has been placed inside the host pipeline at the receiving excavation. The size of the winch being used depends on the sizes of pipe being burst, length of run, and soil conditions. The constant tension of the winch keeps the bursting tool and expander in contact with the unbroken section of pipe and centered within the host pipe. The winch tension, when combined with the percussive power of the hammer, helps maintain the hammer and expander inside the existing pipe’s center. The percussive action of the hammering and cone-shaped head is similar to hammering a nail into the wall; each hammer stroke pushes the cone-shaped