

Pipe Material Options for Pipe Bursting



Manufacturers are seeking ways to adapt their pipe to pipe bursting installations.

Pipe material can be a very volatile subject. It has been a stumbling block to the use of pipe bursting technologies with some utilities around the country. Many of these utilities are so invested in certain pipe materials that it is almost impossible for them to consider other piping materials. While there is a high level of familiarity with the application of HDPE pipe in pipe bursting, there is still considerable interest, in other pipe material options, by owners, engineers, and contractors.

Various pipe manufacturers are working diligently with pipe bursting equipment developers and manufacturers to find real world ways to adapt their pipe products to pipe bursting installations. It takes the extensive experience of these parties to find suitable ways to install

what is best described as sectional, gasketed pipe in the pipe bursting process. There are many factors to consider in what is necessary for these pipe materials to work in pipe bursting applications.

Pipe Bursting Overview

With the recent introduction of a new hydraulically powered static pipe bursting system, ductile iron, steel, and lined pipes, as well as pipes with ductile iron and steel repairs, can now be split and replaced.

During the static bursting process, specially designed bladed rollers are pulled through an existing line by a hydraulically powered bursting unit. As the bladed rollers are pulled through, they split the host pipe. An expander attached to the rollers forces the frag-

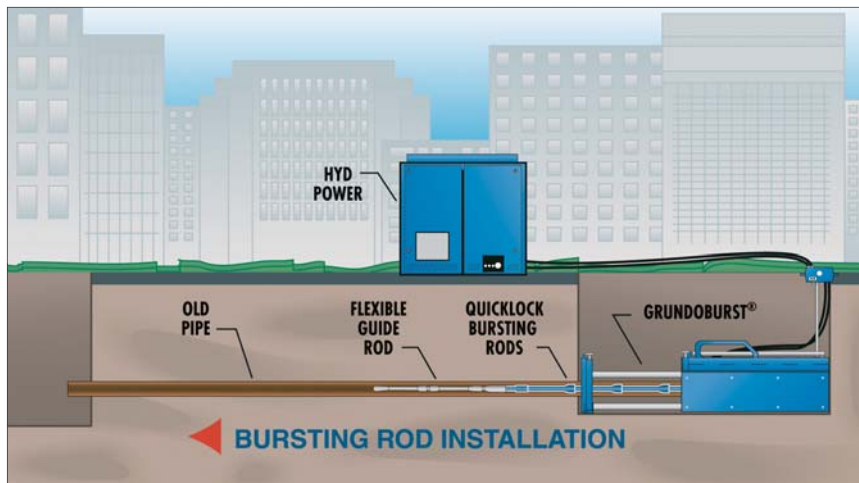
mented pipe into the surrounding soil while simultaneously pulling in the new pipe.

The bladed roller configuration is an essential part of static bursting success for steel and ductile iron pipe materials. The specially designed bladed rollers actually split the host pipe instead of ripping or tearing it. This is a clean process and prevents potential damage to the product pipe.

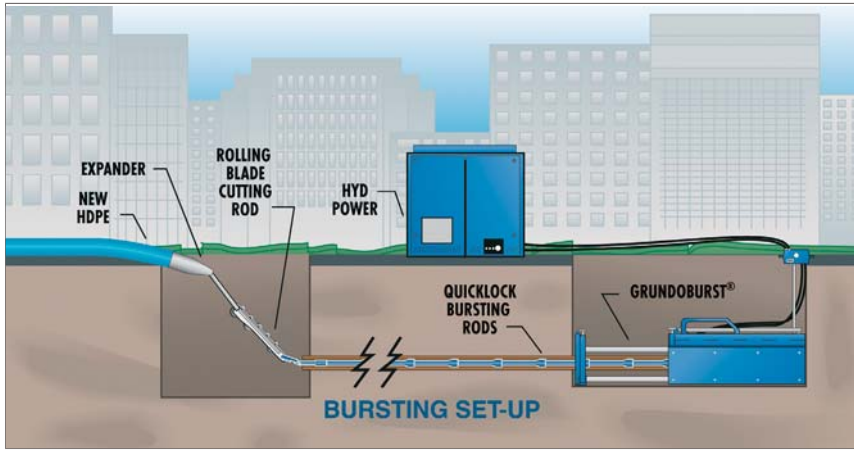
The old pipe must be fractured or split, the remaining fragments compacted into the surrounding backfill, and the new pipe pulled/pushed in before the temporary annular space, created by the pipe bursting tool, begins to collapse and get a firm grip on the new pipe. Once the soil has a firm grip on the pipe, it is difficult if not impossible to continue to move the column of new pipe forward.

Product Pipe Options

PE FOR SEWER AND WATER. The industry is knowledgeable about this pipe material and pipe bursting installations. Fusion welded joints help to make this type of pipe into a one-piece pipe section to whatever length is required for a pipe bursting reach. For example, if a section to be replaced is 500 ft long, a string of PE pipe will be welded together into a string slightly longer than 500 ft and will be laid down in alignment with the launching pit. This method represents at least 95 percent of all pipe bursting installations. This procedure always requires adequate lay-down area. Fusion welding this type of pipe during



Static Pipe Bursting-Step 1. The Quicklock bursting rods are installed through the host pipe, to the launch pit. A flexible guide rod helps ensure smooth installation through the host pipe.



Static Pipe Bursting-Step 2. Once the bursting rods are installed through the host pipe, crew members attach the bladed cutting wheels, bursting head, expander, and new product pipe.

the pipe bursting process is time-consuming and generally not performed in the field. Because of years of field experience a number of ways to connect PE pipe to the pipe bursting tooling have been developed. They are generally all reliable with various advantages to the methods. Both pneumatic and static pipe bursting systems can be used for this type of pipe.

FUSION WELDED PVC. The water and sewer industry are just beginning to see this relatively new type of PVC pipe. It is butt fusion welded, similar to PE, and offers a PVC pipe that is suitable for many pipe bursting applications. Although the pipe is somewhat stiffer, thus requiring longer launching pits, 5:1 ratio (length to depth), the fusion procedures for welding this type of pipe must be adhered to precisely. Experience has shown that the typical scratching on the outside diameter of the pipe is within the manufacturers allowances. This type of pipe cannot withstand the heavy hammering action of a pneumatic pipe bursting system. Because the pipe is stiffer than HDPE for example, it must be installed with a static pipe bursting system so as not to fracture the pipe's connection to the pipe bursting tooling.

RESTRAINED JOINT DUCTILE IRON PIPE. This is another new application for a type of pipe that has been on the scene for a long time. The bell and spigot restrained joint configuration requires that the pipe be pulled backwards (spigot end first). This allows each consecutive bell joint to act like an additional pipe

bursting expander. Only a static pipe bursting system should be used for this type of pipe. The pipe is assembled one joint at a time in the launching pit and pulled one joint at a time. The joints are made up quite quickly, usually in just a couple of minutes.

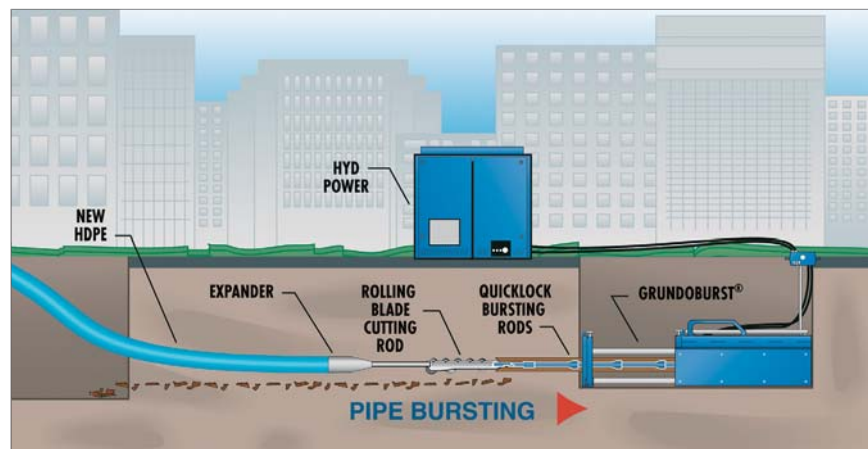
The advantage of this cartridge loading approach is there is no need for a pipe staging area. The new replacement pipe can be unloaded, as needed, from a truck and at the end of the day there is no pipe left on site. This process requires the pipe bursting system to start and stop repeatedly. Each joint is made-up in the launch pit, pulled in and then stopped while the next section of pipe is lowered into the launch pit and assembled to the previous joint.

Loose polyethylene encasement of the

ductile iron pipe is not done, as the wrap will be severely damaged by the old pipes fragments during the installation. A pushing jack may be used to help the column forward during difficult bursting operations.

RESTRAINED JOINT C-900 PVC PIPE. C-900 PVC pipe with a restrained joint utilizes a strong spline and groove assembly. This pipe is assembled and pulled much the same as restrained joint ductile iron pipe. Only static pipe bursting systems should be used due to the stiffness of the pipe. The connection of the PVC pipe to the bursting head consists of an adapter using the pipe and a steel pulling head of the same configuration as the pipe joint. A cartridge loading method can be used. However, this type of pipe appears to be flexible enough to join together before a pipe burst and insert through the launch pit with minimum bending.

NON-RESTRAINED JOINT DUCTILE IRON PIPE. This type of pipe has a low profile joint and was developed primarily for pipe jacking type installations. When pipe bursting with non-restrained joint pipe it is normal to place the static bursting system pulling rods through the length of each new pipe section and connect to a backup clamp that essentially helps to push the column of pipe from the backside. This ensures that the non-restrained pipe joints stay in compression, thus staying together. The internal lining of the new pipe must be protected from the rods or cable



Static Pipe Bursting-Step 3. The entire configuration is then pulled back by the hydraulically powered Grundoburst through the host pipe. The bladed rollers split the host pipe. The bursting head and expander displace the fragmented host pipe into the surrounding soil while the new product pipe is pulled in simultaneously.

used to pull the pipe. In many situations, the rods are sheathed inside small diameter plastic pipe. This helps prevent any rubbing damage to the lining.

VITRIFIED CLAY PIPE (VCP) WITH JACKING TYPE JOINTS. This particular pipe product is much the same as other non-restrained pipe types. Because this is a clay pipe, special care will be necessary to keep the column in good alignment. These pipe sections come with a layer of compressive material at the joints to help equalize the jacking pressures against the end of each section. Clay pipe is quite heavy and you would expect to see some sort of pushing jack in use along with the static pipe bursting system. This type of pipe is installed using the cartridge loading method.

WELDED STEEL PIPE. Welded steel is installed by pulling with static pipe bursting systems. The pipe is by defini-

tion flexible, so it can be welded together and then pulled in, similar to PE pipe. The reality is that this pipe is not really that flexible and probably will need to be welded together as each joint goes in.

Conclusion

The specified pipe and specific pipe bursting equipment should have a proven history similar with the intended application and service environment, as well as data that reflects third-party testing, to substantiate suitability of the pipe by physical property and chemical resistance claims of the manufacturer. The pipe bursting equipment system(s) to be used should be proven to be capable of the required pipe replacement.

The structural condition of the existing pipe also needs to be evaluated and

point repairs identified. CCTV is a useful tool in identifying many pipe defects. Recent CCTV tapes and logs should be included as part of the plans and specifications for projects. Multiple pipe bursting systems and replacement pipes may be evaluated and subsequently specified. Since all systems are not alike, pipe and pipe bursting system capabilities must be evaluated to determine the proper selection for the project under consideration.

There are other types of restrained joint and non-restrained joint pipe that can be installed with similar methods. Consulting with well-qualified pipe bursting consultants and knowledgeable equipment manufacturers can help to make these applications possible. **GE**

The preceding information was provided by TT Technologies (www.tttechnologies.com).