FUSIBLE POLYVINYLCHLORIDE PIPE: SAME MATERIAL, NEW JOINING METHOD

Figure 1 and 2:
Example Heat Fusion Equipment for FPVCP, and FPVCP Installation in Tension via Horizontal Directional Drill

Polyvinylchloride Pipe, or PVC pipe, has a long history of use in the water and wastewater industries. The combination of strength, flexibility, and chemical resistance, make PVC pipe a good choice for environments that are common to water transmission and distribution as well as wastewater collection. While the traditional gasket technology used to join PVC has proven to be efficient, the increasing need for restrained joint piping, and moreover, the increased scope of installation methodologies in use today, such as trenchless technologies require that a different type of joint be employed with pipe that is to meet these new challenges. Fusible Polyvinylchloride Pipe (FPVCP), such as Fusible PVC™, made by Underground Solutions, Inc., is one pipeline material that may be utilized in traditional direct bury, as well as newer trenchless type installations, where a restrained joint and monolithic pipe system is required.

JOINING PVC WITH HEAT FUSION TECHNOLOGY

FPVCP heat fusion joining technology relies on the strength of the pipe material when fused and not a mechanical gasketed joint, like all the other PVC pipe joining technology in use today. The key to the FPVCP heat fused joint is the fact that it provides the same tensile and pressure carrying capacity of the pipe itself. This allows FPVCP pipe to be very well suited to the tensile loading required with many trenchless installation processes and restrained joint pipe design. The development of FPVCP required two separate technical developments to create the fully integral heat fusion joint: first, the formulation of the compound for the extrusion of the pipe is critical for the fusion process to be successful, and second, the actual heat fusion process used to join separate pipe lengths together is required to make the required pipe system in the field.

The FPVCP compound formulation follows the Plastic Pipe Institute Technical Report #2 (PPI TR-2). Certain ingredients and the amounts of those ingredients enhance heat fusion joining where other formulations do not. While the formulation is specific in meeting the PPI TR-2 requirements, it is also NSF-61 and NSF-14 certified, meets the requirements of AWWA C-900 and AWWA C-905, and results in an ASTM D-1784 cell classification of

12454. This cell classification indicates that the pipe meets the same physical properties and parameters as all other common PVC pipe utilized in the water and wastewater industries.

The next key development necessary to join PVC utilizing heat fusion technology was the actual fusion procedure. The fusion process incorporates six general steps: clamping, facing, alignment, heating, fusing, and cool down. The temperature, pressure, and duration of each step is unique to PVC heat fusion. The heat fusion process is monitored via a fusion data recording device. The data recording device serves two purposes. First, this device allows for accurate setting of the pressures for each step. Secondly, it also records the major steps in the fusion process resulting in a record of each change in pressure, duration, shift sequence, among other properties, for each heat fused PVC joint created. The data recording device for logging and heat fusion is readily available within the underground utility industry.

USING FPVCP HEAT FUSION JOINING TECHNOLOGY

Utilizing a heat fusion joint with PVC pipe has several advantages for water and wastewater installations. The fully restrained joint means that the pipe and joint can be readily installed by pulling into place, which is required when installing via trenchless methods. Also, the extremely low profile of the joint means that the pipeline does not have a bell or mechanical coupler to contend with, and for trenchless installations, this simplifies the requirements of the installation methodology. Finally, using a fusion joint means that the pipe can be bent as opposed to deflected at the joints. This allows the full tensile capacity of the pipe to be used, and accounts for the curvature generally required for trenchless installations.

FPVCP is handled, moved, bedded, connected, and installed much in the same way as conventional bell and spigot PVC pipe, which many utility owners and operators find extremely convenient. FPVCP is tapped using standard PVC tap equipment and PVC tapping saddles. When connecting FPVCP to an existing system or to another run of PVC pipe, standard connection hardware is utilized. Repairs to FPVCP are no different than repairs to conventional bell and spigot PVC, the same repair couplings and clamps are effective.

CASE STUDY EXAMPLES OF FPVCP SUCCESSES

FPVPC has been used with increasing success and regularity across the country. Here, several successful projects are discussed that highlight some of the ways that this technology is solving water and wastewater related problems:

Sliplining with Fusible PVC™ in Harrisburg, PA - United Water Pennsylvania was operating a 16" cast iron water main that crossed the Susquehanna River when they discovered it was leaking. Installation by sliplining and Fusible PVC™ pipe were used to line the old cast iron water pipe. 3,500 LF of 12" DR 18 Fusible C-900® pipe was utilized in the rehabilitation and reconnections to the system were made with standard couplings and fittings. The line was put back in service at the end of December, 2005.

Pipe Bursting with Fusible PVC™ in Ypsilanti, MI - In April 2007, FPVCP was used to replace failing cast iron water piping in Ypsilanti, MI, along Michigan State Route M-17. The Fusible PVC™ was installed using a combination of pipe bursting and directional drilling and replaced piping under streets and sidewalks. In total, 7,920 LF of Fusible PVC™ was successfully installed, including 8, 12, and 16 inch pipe sizes.

Horizontal Directional Drilling with Fusible PVC™ in Stow, OH - In May 2008, FPVCP was used for the new Stow North Trunk Main Project. The new water transmission line was installed via Horizontal Directional Drilling in early June, 2008. The City accepted the pipeline after the entire 3,000 LF section was pressure tested at 210 PSI for two hours. This is the second project completed by the City using 16" Fusible C-905®. The first, a water line, was completed in March, 2007.

Chet Allen is a Regional Manager for Underground Solutions, Inc., the developer and provider of Fusible PVC™, including Fusible C-900®, Fusible C-905®, and FPVC™, FPVCP products for use in water and wastewater systems. Underground Solutions, Inc. and Chet are based at 230 Executive Drive, Suite 110, Cranberry Twp., PA 16066, (724) 353.3000.