

# Inliner Files Patent for Steam-Cure Process

Inliner Technologies LLC recently announced that it has filed a patent application with the United States Patent and Trademark Office for its particular method of using a combination of steam and compressed air to cure the resin in cured-in-place pipe (CIPP).

The filing is based on Inliner's method of calculating the cure time vs. liner temperature relationship as it applies to environmental factors, including presence of groundwater, whether the groundwater is moving or static and ground temperature.

While steam has been listed in the ASTM standards since the mid-1980s, its use has been limited because of insufficient knowledge about the process. "With styrenated-based resins, if the temperature rises too high, too quickly, the styrene can boil," said Ed Kampbell, P.E., Inliner's vice president and general manager. "This would create voids in the CIPP wall structure, producing an unacceptable finished product."

Long-term benefits of using steam to cure CIPP include a higher quality finished product as the higher temperatures achieved by using steam allow for a more thorough cross-linking of the resin. "Steam-cured CIPP shows typical gains

of 20 to 25 percent in flexural modulus of elasticity," Kampbell said.

Short-term benefits include a faster processing time and less intrusion on sensitive landscaping. "A project that would take two to three hours to cure with heated water, takes approximately 45 minutes with steam," said Kampbell. "And steam-curing is less intrusive because steam hoses are smaller and can be run through sensitive landscaping environments if the access points are remote from where the equipment is parked, such as a back yard, without removing fences or damaging groundcover."

Inliner's research has shown that the steam-curing method is ideal for lines that are 4 to 24 in. in diameter but has already used steam to successfully renew pipes up to 60 in. in diameter.

Inliner has also applied for a patent on its re-engineered fittings that seal the ends of the liner during curing. The fittings have an expanding taper on the barrel that tightens its hold on the tube as the tube wants to slip out — thus providing a stronger resistance to blowout, increasing the safety level for workers.