

AUTOGENOUS HEALING OF CONCRETE PIPE

Autogenous healing of concrete pipe is common when the buried pipe is in the presence of moisture, either on the soil side or inside of the pipe itself. These cracks, when healed autogenously, are stronger than the original concrete. Evidence of autogenous healing is a whitish substance forming along the crackline.

Simply stated, autogenous healing is the ability of concrete to heal itself. In the presence of moisture, concrete extrudes calcium hydroxide which, upon exposure to the atmosphere, is converted to calcium carbonate (limestone) which seals the crack.

These calcium carbonate crystals are formed when the carbon dioxide in the surrounding soil, air and water carbonates the free calcium oxide in the cement and the calcium hydroxide liberated by the hydration of the tricalcium silicate of the cement.

The first documented discovery of autogenous healing was by the French Academy of Science in 1836. Since then, there have been numerous examples where cracks in concrete have been repaired naturally by moisture reactivating the hydration process of the cement in the concrete.

Recently, some testing on reinforced concrete pipe was performed to determine the extent of autogenous healing. Two sections of 12-inch RCP were hydrostatically tested under 12 psi water pressure for several days. One pipe, which had been damaged in transportation, developed several small leaks near the bell end of the pipe. These small leaks were completely sealed off within a couple of days by autogenous healing, demonstrating that concrete pipe, in the presence of moisture, can and will heal itself.

Another example was where a 40-foot reinforced concrete bridge had a load of 106 tons applied to the three month old structure and distinct diagonal tension cracks formed in both ends of the bridge. After three years of exposure to the weather, the cracks were healed. Then about six times the original load was applied and although new cracks appeared, none of the original cracks reopened.

CONCLUSION: In the presence of moisture, minor cracks in concrete pipe can be healed by autogenous healing.