

SPECIFICATION OF COLLECTOR SEWER RENOVATION WITH VIP-LINER MODULES

I. Collector sewer inspection and renovation preparations

1. The first stage of a collector sewer renovation process is to inspect the piping with a snake camera and assess the level of wear, fouling and obstructions.
2. If the collector sewer is found to be fouled too heavily to enable jacking of the Vip-Liner modules, the collector sewer piping will require cleaning and flushing with high-pressure piping flushing; all roots and obstructions will require removal with a special hydraulic root shear.
3. Following its thorough cleaning, the collector sewer is reinspected with a snake camera to verify the cleaning results. If persistent obstructions are revealed, the cleaning and flushing stage has to be repeated.
4. The minimum clear diameter of the inspection chamber required to launch the Vip-Liner modules is 1000 mm. If the launching inspection chamber has an angled base, the base will require reworking (by breaking up) to form an inline-flow (180°) chamber when seen from the end of the collector sewer to be repaired. With the launching inspection chamber ready, a launch bed is lowered to its bottom. The launch bed will jack the Vip-Liner modules of the required diameter. The hydraulic power unit and its IC engine remain outside of the launch inspection chamber to prevent ingress of exhaust gas.

II. Installation of the Vip-Liner modules

1. The Vip-Liner modules are jacked into place by two operators. One operator remains on the surface to monitor the hydraulic power unit and feed the Vip-Liner modules to the other operator, who works on the bottom of the inspection chamber. The operator in the inspection chamber uses a control pendant to operate the Vip-Liner hydraulic jack. A cage of required diameter is installed on the hydraulic jack of the launch bed. The Vip-Liner modules are placed on the cage. To facilitate the jacking operation, the hydraulic jack features a launch bed lifting arm. The arm can tilt the launch bed up to 45° above the chamber bottom before loading the next Vip-Liner module. With the first Vip-Liner module loaded on the launch bed, a locking fixture is installed on its rear (which has a turned groove for engaging the fixture). The locking fixture prevents displacement of the Vip-Liner module while it is joined to the next module in line. The joint is made correctly when an audible snap is heard. Once the joint has been verified to be properly made, the locking fixture is removed and the joined Vip-Liner modules are jacked into the collector sewer. These steps are repeated until the first Vip-Liner module enters the inspection chamber on the other end of the collector sewer.
2. Once the Vip-Liner jacking into the collector sewer is complete, it is recommended to inspect the interior with a snake camera and verify that all module joints are correct.

III. Sealing the Vip-Liner modular string at both terminal chambers of the common sewer

1. The collector sewer renovation process is completed in its both end inspection chambers. The Vip-Liner module can be finished and sealed flush with the inspection chamber wall, or the ends of the Vip-Liner module string can be connected to a new inspection chamber made from PEHD and installed as a liner inside the existing end inspection chamber when building a uniform sewer system from PEHD components. The void between the existing chamber and the new PEHD chamber shall be sealed e.g. by casting concrete from the chamber base to 200 mm above the joint between the new chamber's bottom and the access shaft; the remaining free void is to be filled with e.g. sand.
2. **Sealing the voids between the installed Vip-Liner modules and the original common sewer shell.**
 1. With the Vip-Liner modules jacked in place, it is necessary to seal the void between the modules and the common sewer shell with grout (e.g. ash cement or foamed concrete); the composition of the sealing grout is determined according to the renovation project specifications.