

TRENCHLESS

RENOVATION OF LARGE DIAMETER PIPELINES

By Vladimir Butin

The importance and demand for renovation of sewers and water disposal pipelines using trenchless methods are without doubts. The rehabilitation of sewers is increasingly becoming a problem for many Russian cities. The need for renovation of gravity pipelines with diameters of 500–3500 mm is rapidly growing. This trend is caused by deteriorated condition of the sewers, which are mainly made of reinforced concrete. Accidents and breakdowns lead to negative consequences on social and production infrastructure as well as environment.

The wear of reinforced concrete sewers is caused by several factors, mostly due to physical and chemical impact of aggressive substances, formation of acidic condensate at the top of the pipe and gas corrosion. “The wet” part of the sewer is exposed to abrasion wear, leaching and biofouling.

The advantages of trenchless technologies are very obvious:

- Excavation and road works take less;

- Independence from regulatory services, which coordinate the works (the less the interference with underground infrastructure the less works need to be coordinated);

- Practically no danger of damaging other underground communication surrounding repaired pipeline.

The deployment of these technologies in Russia shows that the costs are lower or just under those of conventional methods. Moreover, there is always a choice between expensive and budget types of trenchless methods. The cost of works are directly depend on the complexity of the equipment used at the site. Some methods require expensive equipment and others only need a minimal set of tools. Therefore, the price of renovation differs. Trenchless methods are in general quite lucrative.

When analysing modern trenchless technologies, we can say that adequate

methods of trenchless renovation must insure the internal elements providing high chemical resistance and necessary structural properties. This is due to the fact that residual resource of large diameter sewers in most of the cases do not exceed 30% in Russia. Renovation techniques like sleeves, cement mortar or polymer lining, thin walled PE pipe casing and elastic bands can only provide leak tightness and might be ineffective. The use of inappropriate renovation technique can't stop structural deterioration and, therefore, cannot ensure designed operating life.

From this point of view, PE modules are the most prospective and effective method of restoration of structure and integrity of operational parameters of the pipeline.

The main advantages of this technology are:

- High chemical resistance and structural properties;
- Relatively low cost;



- Easy and simple installation;
- No need in specialist equipment at the site;
- Possibility of live renovation (no need to disconnect the pipeline).

The only disadvantage is the cost of delivery of the bulky oversize elements to the site.

Let's describe the method for pipe-in-the-pipe method of live modules installation.

Description of Spirally Wound pipe modules with male/female thread joint system for installation in active sewer flow conditions.

The work is done in several stages.

The first stage is the inspection of the pipeline to determine its real condition. It includes inspection of the manholes, chambers, pipeline layout, internal CCTV, determination of position and elevation of the pipeline sections.

Evaluation of defects, report and technical solutions are provided upon completion of the inspection. The right threaded modules of necessary diameter, length and hoop strength are selected, the position of the pits is determined and operations schedule is finalised.

The second stage includes preparation works: coordination and obtaining of the necessary approvals, opening of chambers and manholes, pit excavation if needed, delivery and storage of the materials and equipment positioning. Pipeline cleaning and repeated CCTV is provided.

At the third stage, the threaded modules are fed into the pipeline through the chamber or start pit, connected using the winch, pushed through the pipeline live, using the winch (normally in the direction of the

flow). The sludge effectively serves as a lubricant that protects the outer surface from damage, the buoyant force reduces the load and assist the installation.

At the end of this stage the pipe is fixed and the gap between the host pipe and a new pipe is filled with the special filler forming a solid three-layered structure. Then the works quality control is done, the chambers are restored and the pipeline is ready for operation.

Renovation of worn sewers using SPIROLINE® modules is one of the most simplest, cheap and efficient methods where works are done live. This eliminates the need in bypasses. It has been proven that in most of the cases this is the only possible way of emergency renovation of sewer pipelines.

