

## SPR Method (a Trenchless Sewage Pipeline Renewal Method)

### Features

SPR method rehabilitates an old sewage pipeline into a strong and solid composite pipeline composed of the existing pipe, a rehabilitation pipe and backfill material. The rehabilitation pipe is constructed by winding rigid polyvinyl chloride (PVC) profile inside the existing pipe and the backfill material is applied in the space between the existing and rehabilitation pipes.

The main characteristics of the method are as follows:

- 1) Executable without excavating roads: SPR is a trenchless method executed without road excavation, as all the materials and equipment required are transported from manholes to the inside of pipeline. As it is trenchless method, waste such as earth and sand is not generated at all.
- 2) Excellent water-tightness: The rehabilitation pipe has excellent water-tightness against internal and external water pressure because it is manufactured with the fusion of poly-ethylene resin (PE method) or interlocking of polyvinyl chloride (PVC) profile mixed with water proof seal (IL method).
- 3) Excellent corrosion resistance - no fear of corrosion: As the material of the surface of profile is either poly ethylene (PE) or PVC, the profile has excellent corrosion-resistance and it will not be corroded by hydrogen sulfide.
- 4) Discharge capacity after the rehabilitation equivalent to or better than the capacity before the rehabilitation: Because the coefficient of roughness of either material of the rehabilitation pipe is excellent (0.01), the rehabilitation pipe should have the flow rate equivalent to or larger than the rate in the existing pipe despite the fact that the diameter of the former is smaller than that of the latter.
- 5) Winding machine transportable through a small-diameter working hole: Since the winding machine can be disassembled for transportation, it can be transported into a sewage system from a manhole regardless of its shape so long as it has a diameter of approx. 600 mm.
- 6) Executable without interrupting the service: Rehabilitation can be executed while sewage is flowing in a sewer pipe.
- 7) Little influence on social activities: As this method requires no excavation at all, it has little impact on social activities such as traffic and it requires no measures against odor or noise. Therefore, it is easy to obtain approval of the people for the implementation of the work.

### Basic Concept or Summary

A new pipeline will be constructed by manufacturing a pipe by interlocking and fusing rigid PVC or PE material and filling the space between the new and existing pipes with such material as mortar inside the existing pipeline. It is possible to execute this work with sewage flowing in the existing pipeline if its flow rate is small. While slight deviation of joint on an existing pipe can be accommodated by making the diameter of a rehabilitation pipe smaller, unevenness or meandering of an existing pipe will be recreated when a new pipe is installed, in principle.

<Implementation procedure>

#### (1) Preliminary survey

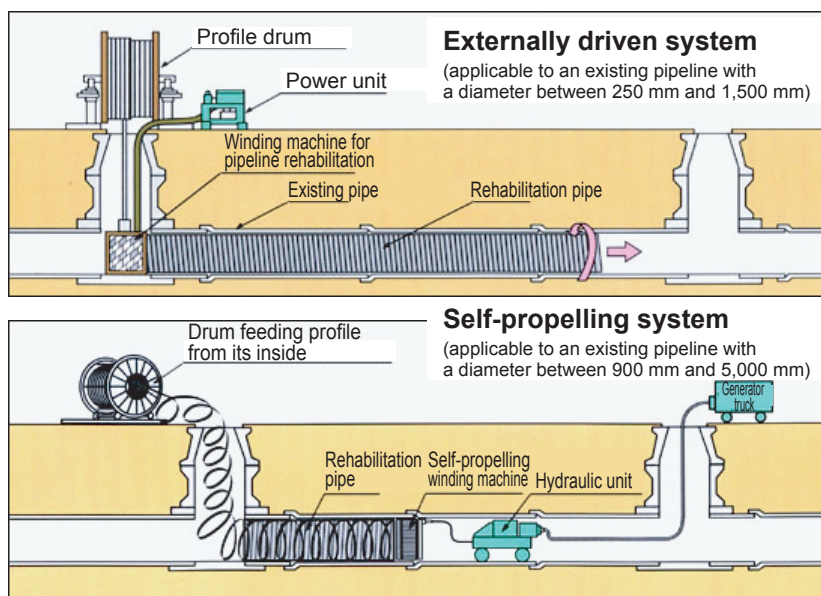
To survey inside a sewer pipeline to decide whether SPR method can be applied to the pipeline or not

#### (2) Decision on the diameter of a rehabilitation pipe

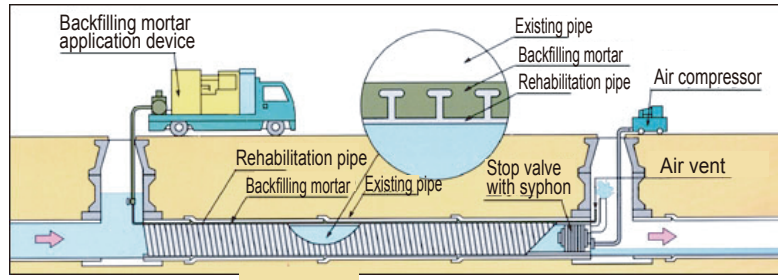
On the basis of the result of the preliminary survey, the diameter of a rehabilitation pipe shall be determined. In principle, a diameter which shall make the flow rate in the new pipeline equivalent to that in the existing one shall be the standard for the diameter of a new pipeline. The actual diameter of a new pipeline can be determined in accordance with the actual conditions, including unevenness, meandering and step-like gaps, of an existing pipeline.

#### (3) Piping

Two types of piping systems, the externally driven system and the self-propelling system, are used for the piping.

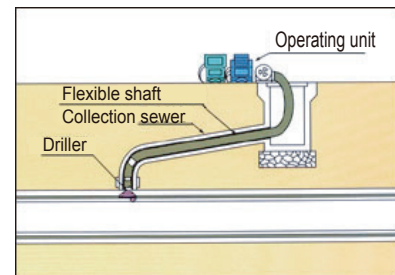


- (4) For a rehabilitation pipe with a diameter of less than 800 mm, metal chain shall be installed inside the pipe and it shall be filled with sewage or water supplied from a water truck to prevent it from floating when backfilling material is applied. For a rehabilitation of a larger pipe, supports shall be installed inside the pipe to prevent floating and deformation of the pipe when backfilling material is applied.
- (5) Application of backfill material: Backfill mortar specifically developed for this method shall be applied. Outlets of collecting sewers shall be installed before the application.



(6) Drilling of collecting sewer outlets: Collection sewer outlets shall be drilled to connect collecting sewers to an existing collection sewer.

1. Device for drilling from a collecting sewer  
The outlet shall be created by inserting a driller in an existing collecting sewer from a pit, expanding the drill bits with air and rotating the bits.
2. Device for finishing from inside an existing pipeline  
If an outlet on an existing pipeline is uneven, the outlet shall be finished from inside the pipeline.



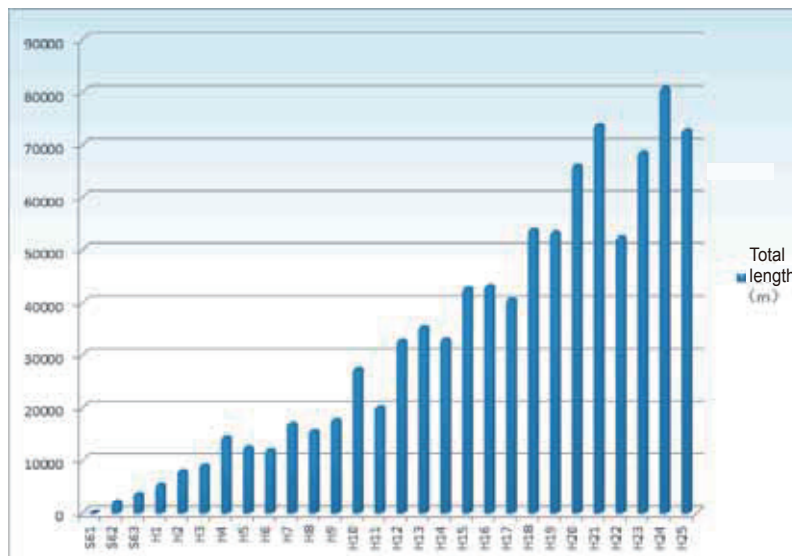
(7) Finishing of the ends of a main and inverts: The work shall be completed with the finishing of the ends of a main and inverts.

**Effects or Remarks**

No waste generation: Generation of industrial waste can be minimized as a new pipeline is created by rehabilitating an existing one.  
The execution without excavation reduces CO<sub>2</sub> emission.

**Installation in Practice or Schedule**

**Domestic**



**Overseas**

Sekisui Chemical has rehabilitated more than 800 km of sewage pipeline with its original trenchless sewage pipeline rehabilitation method in 42 countries in the world including:

- 1) Asia and Oceania: Japan, Australia, Singapore, South Korea, Hong Kong, Taiwan, Malaysia, etc.
- 2) North America: USA, Canada
- 3) Europe: Germany, France, UK, the Netherlands, Russia, Spain, etc.

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