

# SEKISUI SPR Americas, LLC

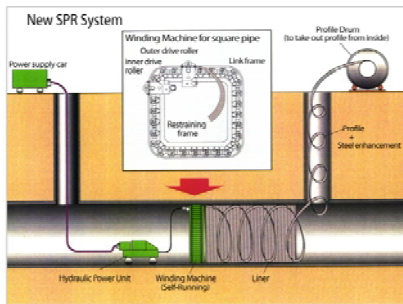
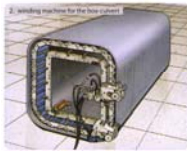
•Speed •Service •Superiority

## Global Trenchless Pipeline Renewal Solutions



### The SPR Pipeline Renewal Product

- Ideal for larger diameter circular and non-circular pipeline renewal projects
- Can be installed in live flow conditions
- Negotiates bends & curves
- Existing entry points can be used
- Can be installed in a wide variety of host pipe materials
- Excellent abrasion resistance
- Improved flow capacity
- Provides excellent corrosion resistance
- Installed by local certified installers



Inspect & Clean Existing Pipe (high-pressure spray, remove loose debris)

Wind the SPR product into place



Install internal centering braces prior to grouting



After bulkheads are installed, grout is pumped into annular space (360°)



Internal bracing is removed, and the renewed pipe is ready to be put back into service

For more information, please contact:

[info@sekisui-spr.com](mailto:info@sekisui-spr.com)

or, go to

[www.sekisui-spr.com/info](http://www.sekisui-spr.com/info)

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## **SEKISUI-SPR Features and Benefits**

### **SPR WOUND PROFILE**

#### **1. Corrosion resistance**

The PVC material used to manufacture the SPR profile is the same as used to manufacture standard size rigid PVC sewer pipes. Chemical resistance in the sewer environment is excellent.

#### **2. Improved flow coefficient**

The PVC smooth inner surface created with the SPR wound profile gives an average roughness coefficient of 0.010. This reduction offsets the reduced diameter created during the rehabilitation process. Depending upon design criteria and individual pipeline circumstances the rehabilitated pipe could achieve the same flow characteristics as the host pipe.

#### **3. Produces a composite pipe structure**

The unique rib structure within the PVC profile design acts to anchor the profile to the grout. The grout also forms a strong bond with the host pipe. This combination of PVC profile, grout and host pipe act together to form a strong composite pipe within a pipe.

#### **4. Profile water tightness**

The unique design of the SPR PVC profile allows a wound profile to be created which incorporates a strong locking mechanism between each profile strip. In addition each profile strip incorporates a sealing mechanism preventing water ingress and grout ingress during the installation process. The seal has been tested under a 25 feet head of water without leakage.

#### **5. Earthquake resistance**

The SPR wound profile method of pipe rehabilitation produces a composite pipe that is flexible enough to withstand earthquake activity. The SPR profile maintains performance even with a host pipe diameter reduction of 25%.

#### **6. Extended life**

Excellent corrosion and abrasion resistance combined with enhanced structural capabilities ensures a greatly extended life span for the rehabilitated host pipe.

### **SPR PROFILE WINDING MACHINE**

#### **1. Minimal surface excavation**

The SPR profile installation process is designed for installation from within existing manhole shafts and access points. It may, however, require a manhole top cone to be removed or an excavation to assist with the cleaning process (if the host pipe has high levels of silt and debris) but typically the winding machine and other related installation equipment can be installed from a 4 feet minimum diameter access shaft.

#### **2. Long lengths achievable**

The winding machines can be operated in two differing ways. The 'winding and pushing method' is limited in achievable distance. This method allows the winding machine to remain

within the access shaft during the winding process. The new pipe is created as the profile is fed into the winding machine by locking the profile together. As the newly created pipe is formed it is simultaneously rotated and pushed into the host pipe. The limiting factor in installation length is pipe skin friction between the PVC wound pipe and the host pipe. Lengths are a function of host pipe straightness, wound diameter, new pipe size etc

The 'self winding' method for creating the new pipe requires the winding machine to traverse along the host pipe being rehabilitated while the new pipe profile remains stationary. The length limitation then becomes a function of site operational logistics.

### **3. Able to rehabilitate any shape**

The design of the profile winding machine allows the rehabilitation of circular and non-circular pipelines. The 'winding and pushing' method is for circular pipes but the 'self-winding' method allows the rehabilitation of horseshoe-shapes, egg shapes, elliptical shapes, square and rectangular shapes as well as conventional round shape pipelines.

## **SPR INSTALLATION**

### **1. Flow conditions**

Most rehabilitation projects require the host pipe flows to be bypassed during the construction process. However, the wound PVC profile is able to carry flow prior to grouting in position and is capable of being wound and grouted in position under partial flow conditions.

### **2. Adaptable to host pipe conditions.**

The wound profile can accommodate bends in the host pipe, offset pipe joints, size deviations (within limits) and still maintain a joint free system. Lateral pipes can be reconnected to make an integral pipeline rehabilitation system. Under certain conditions the original pipe grade may be restorable if needed.

### **3. Joint free lining**

As the newly wound pipe is created from a continuous length of PVC profile there are no joints to create potential leakage in the future. The new pipe once wound into position is then fully grouted around its circumference to provide a composite finished pipe-within-a- pipe structure.

### **4. Low Social Impact**

The SPR methodology utilizes existing host pipe entry points as access for the rehabilitation process. Either no or minimal surface excavation is required resulting in a truly 'No-Dig' approach to gravity system pipeline rehabilitation.

## Fundamentals of the Sekisui SPR Method

The Sekisui SPR method consists of a rigid PVC profile which is spirally wound into an existing pipeline. Successive wraps of profile are locked together and the annular space between the liner and the existing pipe is grouted. The result is a strong composite pipe integrated with the existing pipeline.

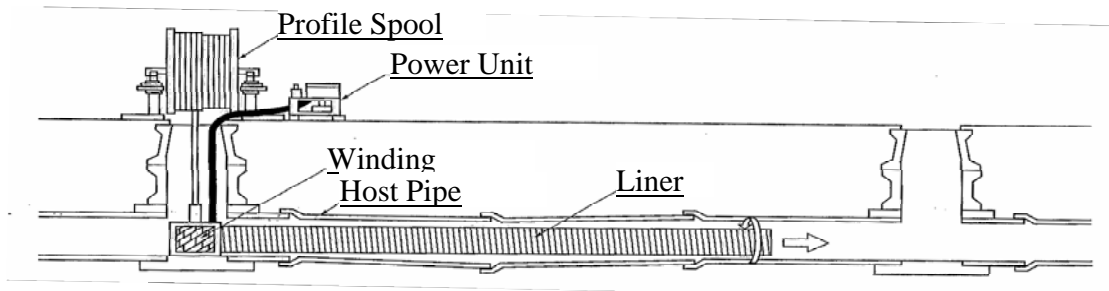
The fundamental steps of the SPR method are:

1. cleaning the host pipe,
2. winding the liner, and
3. grouting the annular space

Two winding methods can be used depending on the site conditions. These are the “Pushing” machine and the “Self Running” machine winding methods. The Self Running method has two variants, the Super SPR and the SPR Out-of-Round technology. Each of these systems is discussed below:

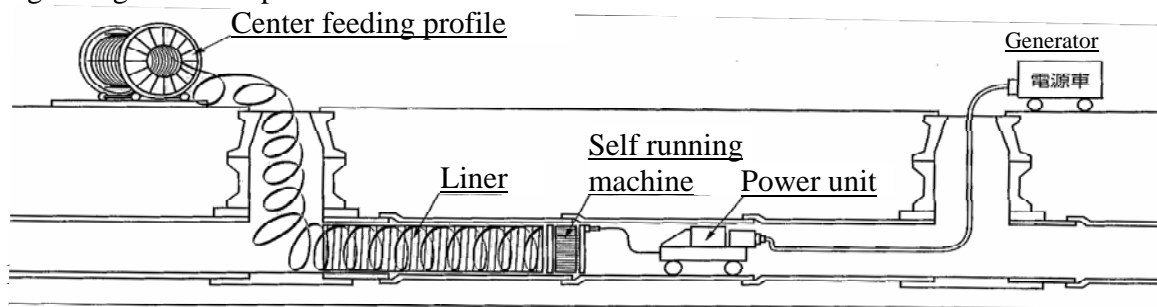
### A. The Pushing Machine Winding Method

The winding machine is placed in the channel of the existing access chamber. The plastic profile strip is then fed from a spool above ground down to the machine. As the profile is spirally wound onto itself by the winding machine the interlocking edges of the profile are locked together to form a liner within the existing pipe.



### B. The Self Running Machine Winding Method

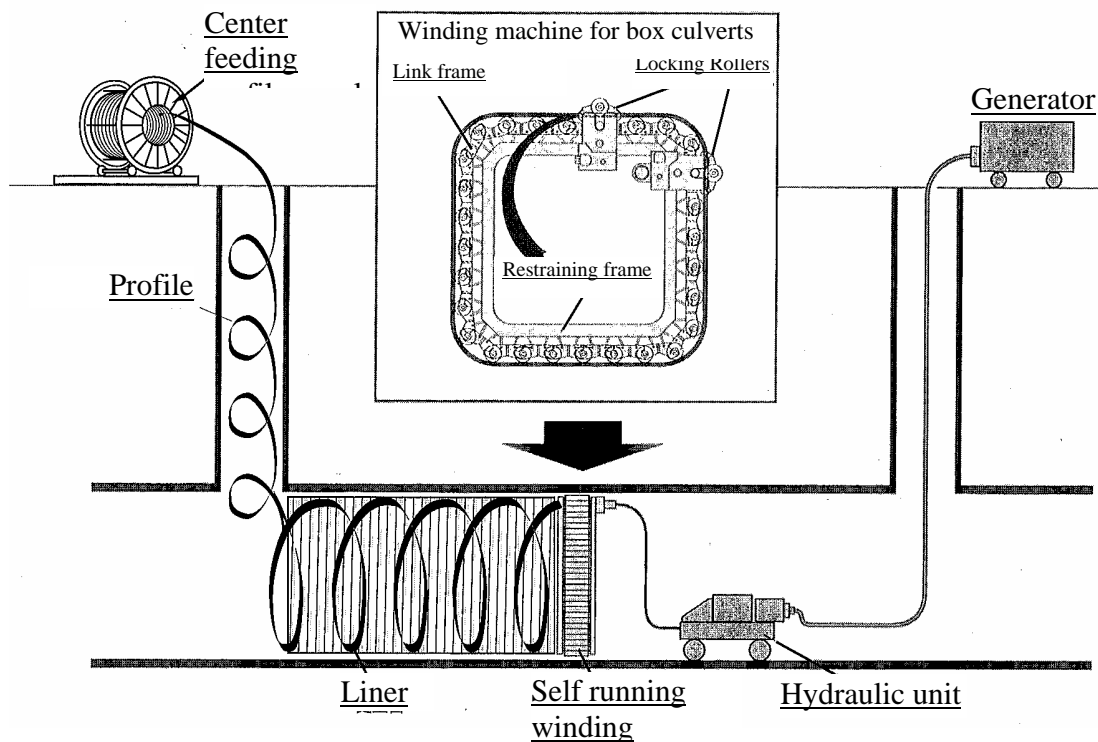
The winding machine is positioned in the channel of the existing access chamber or at any point within the pipeline. Profile is fed to the machine from the center of a spool designed specifically for this process. The machine then rotates and advances down the pipeline. As the machine rotates it spirally winds the profile to form a pipe behind it. As this process leaves the wound pipe behind it there is no friction between the liner and the host pipe. As a result liners of much longer lengths can be produced.



The Super SPR method has been developed specifically for the renovation of large diameter pipelines. It utilize “W” or “U” shaped steel reinforcing section in conjunction with the Self Running Machine to produce composite pipelines of high stiffness.

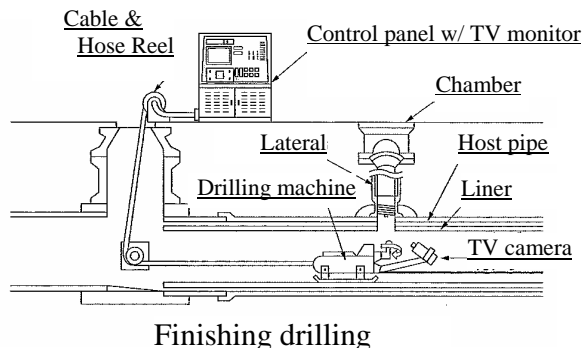
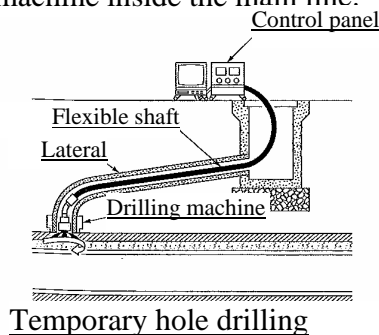
2) SPR Out-of-Round Technology

The Out-of-Round technology has been developed to cope with all different shapes of noncircular pipes. The winding machine consists of a guide frame which is manufactured to the same shape as the existing pipe. Around this frame rotate a series of driven rollers which wind the profile together and move the machine forward. The machine is suitable for winding both normal and reinforced profiles into any prescribed cross-sectional shape.



C. Making Lateral Connection

After completion of the grouting process an initial hole is cut through the profile by feeding a cutter down the lateral pipe. The opening of the lateral connection is completed using a cutting machine inside the main line.



Standard Properties of the SPR Method

SEKISUI-SPR

No.	Title	Item	Standard Properties				Comments	
1	Purpose of Lining		1. Restore Pipeline strength 2. Stop leakage 3. Improve flow capacity 4. Improve corrosion resistance 5. Prevent tree roots from entering the pipeline 6. Re-establish pipeline grade 7. Improve resistance to earthquake damage					
2	Suitability of SPR Method	Pipeline	Gravity Systems: Sewer, agricultural, drainage					
		Shape of Pipe	Round, rectangular, horse-shoe, egg, stone built etc					
		Pipeline length	Host Pipe Shape	Size (mm)	Max. Length Pushing	Distance		limit is host pipe friction etc  <i>self running'</i> limit is the site logistics
						Self Running		
			Round	10" to 14"	200 ft			
				16" to 24"	300 ft			
				28" to 32"	450 ft			
				36"	450 ft	650 ft		
				40" to 60"	450 ft	1000 ft		
			60" to 120"		1500 ft			
Rectangular	36" x 48"				600 ft			
	52" x 82"				1000 ft			
	86" x 120"			1500 ft				
Horse-shoe	36" x 48"			600 ft				
	52" x 82"			1000 ft				
	86" x 120"			1500 ft				
HOST PIPE CONDITION	Condition of Host		Yes or No for SPR					
	Breakage of Pipe	Collapse		No	Unless localized			
		Partially missing		Yes				
		Cracked Entirely		Yes				
	Cracking	Horizontal and vertical		Yes				
	Joint Movement	Gap or joint apart		Yes	May need partial repair			
		Offset						
		< 0.75 inch		Yes	Host < 20inch			
< 2 inch		Yes	Host 24 inch to					
< 4 inch		Yes	Host 52 inch to					
< 6 inch		Yes	Host > 82 inch					
Bend Angle with standard profile	Less than 5° (Pushing)		Yes	For greater angles consult manufacturer				
	Less than 10° (Self Running)		Yes					
	Less than 3° (Out-of-Round)		Yes					
Meandering			Yes	Depending on conditions				

No.	Title	Item	Standard Properties		Comments	
2	Suitability of SPR Method (cont'd)	Host Pipe Condition			Yes or No for SPR	
			Infiltration	Pressurized	Yes	After controlling water pressure
				Non Pressurized	Yes	
			Protruding Mortar		Yes	remove
			Protruding Laterals		Yes	remove
			Free Roots in l.ine		Yes	remove tree roots
			Corrosion of Host	re-bar exposed	Yes	
		Loss of host pipe wall		Yes		
3	Construction Parameters	Minimum Work Space	Profile winding - one traffic lane Grouting: one traffic lane			
		Safety Devices	Safety harness Gas detector Forced air Lighting		Safety plan prior to construction	
		Working Temperature	Outside temperature: 23degF to 104degF			
		Flow in line	Profile can be wound with some flow Flow levels and velocity based on operator safety & installation requirements		Operational plan req'd	
		Profile winding direction	From upstream to downstream			
		Grouting	From upstream to downstream. Pump grout into annular space. Use bracing frames to prevent flotation and centralise in host pipe		100 foot sections 2 stage grouting are typical	