

SPR™ ST

HIGH STIFFNESS STRUCTURAL REINFORCED LINER FOR GRAVITY
PIPELINES FROM 450 mm TO 2500 mm



FORMING GLOBAL CONNECTIONS

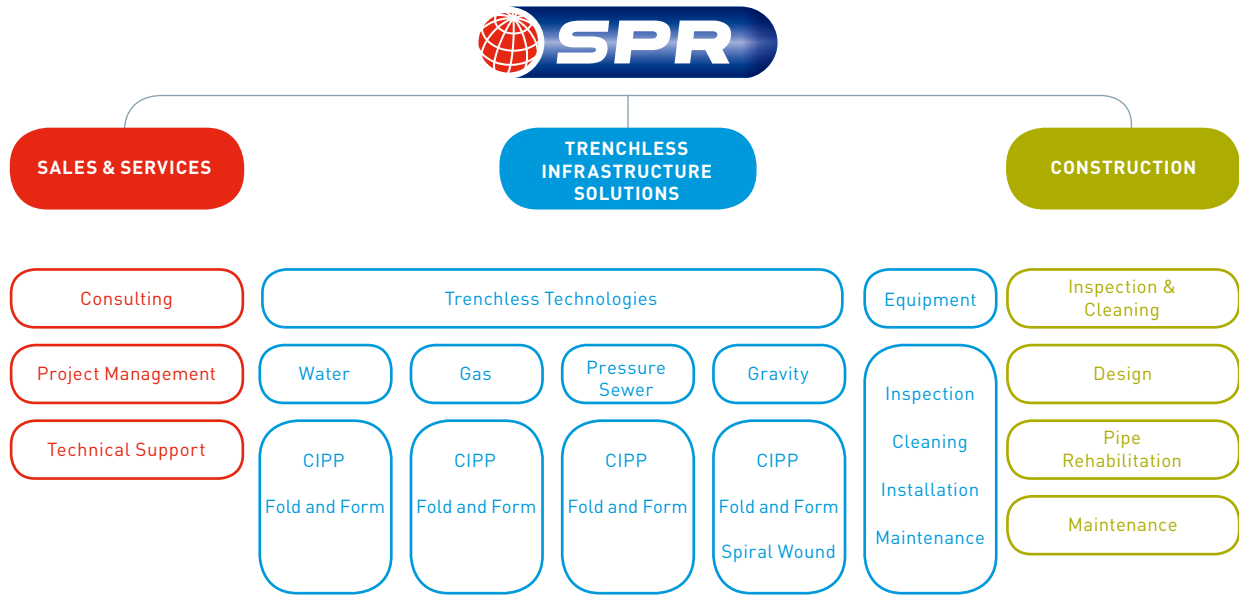


SEKISUI SPR'S TECHNOLOGIES AND SERVICES

SEKISUI SPR Group is synonymous with superior solutions for underground infrastructure worldwide.

SEKISUI SPR offers outstanding and environmentally sustainable technologies and construction services

for water supply and drainage through its global sales network.



SEKISUI SPR's innovative, patented, and world renowned spiral wound technologies are used the world over for the time and cost efficient means they offer for rehabilitating damaged pipes with minimum impact on the environment.

The spiral wound technologies for gravity are based on the principle of winding a continuous plastic strip into a liner directly into the deteriorated pipe. The plastic strip is spirally wound via a patented winding machine positioned in the base of an existing manhole or

access chamber. The edges of the strip interlock as it is spirally wound to form a continuous watertight liner inside the host pipe. For the spiral wound rehabilitation of gravity pipes SEKISUI SPR offers five technology systems:

	SPR™	SPR™ PE	SPR™ EX	SPR™ ST	SPR™ RO
Diameter	800 – 5500 mm 32 – 217 in.	900 – 3000 mm 36 – 120 in.	150 – 1050 mm 6 – 42 in.	450 – 2500 mm 18 – 99 in.	800 – 1800 mm 32 – 72 in.
Material	PVC	HDPE	PVC	PVC	PVC
Shape	circular, non-circular, custom shape	circular	circular	circular	circular
Installation	fixed diameter	fixed diameter	close fit	fixed diameter	close fit



A STEEL REINFORCED FLEXIBLE LINER

The SPR™ ST pipe rehabilitation process is a solution for restoring the hydraulic efficiency, reliability and integrity of aging sewers, storm drains and culverts.

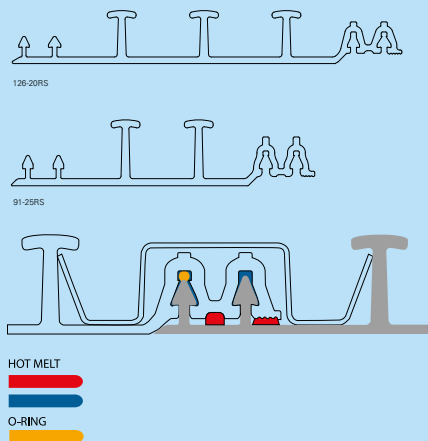
Where required for greater stiffness, the liner can be reinforced by simultaneously winding a profiled strip of steel under the tees of the PVC profile.

The plastic profile that forms the liner is provided in a range of sizes and thicknesses. The appropriate profile is selected to provide a liner with sufficient stiffness to meet the design requirements for the project. Profiles may be reinforced with steel for high loading applications, maximizing liner stiffness whilst minimizing loss of cross section.

Project experience

SPR™ ST has been used to rehabilitate sewers, stormwater lines and culverts around the world. It has proven capable of providing a structural liner for severely deteriorated pipelines, and has been installed under difficult site conditions with minimal community disruption.

PVC Profiles and Sealant Materials



Cross-section of a typical profile, showing the mechanism that locks together successive wraps of profile, overlaid with steel reinforcement

Safe work sites and low noise

The deteriorated pipeline is first cleared of debris and obstructions, cleaned and inspected, the diameter measured and then proved.

The SPR™ ST winding machine is lowered to the base of the access chamber through standard manhole openings. The PVC profile and steel is fed into the machine from above ground spools. The winding machine then winds the PVC profile to form a liner. If required, a continuous strip of steel can be locked under the PVC profile tees by the winding machine.

The process continues until the liner wound by the SPR™ ST winding machine reaches the end of the pipeline length to be rehabilitated.

The ends of the liner at both access chambers are sealed and rendered to make them smooth with the host pipe.

The annulus between the fixed diameter liner and the host pipe can be filled with cementitious grout immediately after winding is completed.

HIGH STIFFNESS TO MEET THE STRICTEST REQUIREMENTS

Flow advantages

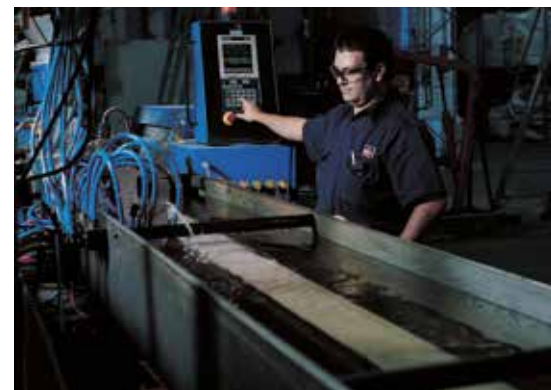
- Diameter can be varied with adjustable winding cages to maximise liner diameter
- Hydraulically efficient, smooth bore with circular cross section
- Usually greater hydraulic capacity than the host pipe
- No ripples or wrinkles even when host pipe joints are offset
- Winds smoothly around large radius pipeline bends

A strong flexible liner

- Can be designed as a structural liner. A range of PVC and steel combinations are available to meet design requirements
- Structurally efficient circular cross section - even when the host pipe is misaligned
- Constant wall thickness even when negotiating voids in the host pipe
- Machine installed. Liner installation does not depend on the standard of workmanship in difficult conditions

Fast installation with minimum community disruption

- Rapid set up, safe work sites and low noise during construction
- No need to excavate launch pits or store pipes on-site
- Oval cages in many cases conform to invert and minimise benching removal
- Small support vehicles - less disruption of traffic
- Can operate with some flow in the existing pipe, up to 25 % subject to velocity and safety considerations
- Installation possible from difficult to reach access chambers - support vehicles and equipment can be placed remotely



Quality assured profile extrusion



Stiffness testing of SPR™ ST liners

The benefits of SPR™ ST at a glance

- High stiffness structural liner
- Fixed diameter
- Diameters from 450 mm to 2500 mm using two profile types
- Manufactured from pipe grade PVC with steel stiffening ribs
- Suitable for gravity flow sanitary sewer and stormwater applications
- Cell Classification of 13354 in accordance with ASTM D 1784
- WRc Approved™ (PT/304/0710)

Proven pipe material

- Made from similar grade of PVC as new sewer and drainage pipe.
- Cell Classification of 13354 in accordance with ASTM D 1784.
- Profile sealing materials are tested to confirm suitability in high ambient temperature sewer environments.
- Factory manufactured, with consistent material properties. The pipe strength does not rely on curing in uncertain conditions.

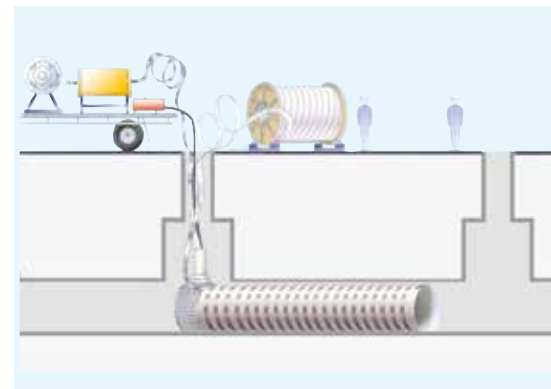
Plastic and steel profiles

The plastic profile that forms the liner is provided in one of two sizes. The appropriate profile and steel section is selected to provide a liner with sufficient stiffness to meet the design requirements for the project.

Design

Numerous industry specifications provide design methods applicable to SPR™ R0, including:

- ASTM F 1741: "Standard Practice for Installation of Machine Spiral Wound PVC Liner Pipe for Rehabilitation of Existing Sewers and Conduit"
- ASTM F 1697: "Standard Specification for Poly Vinyl Chloride Profile Strip for Machine Spiral-Wound Liner Pipe Rehabilitation of Existing Sewers and Conduit"
- Australian Water Authority Specifications, usually based on Australian Standard AS 2566.1: 1998 "Buried Flexible Pipelines, Part 1: Structural Design"



On-site setup for SPR™ ST installation

Section Properties of Typical SPR™ ST Profiles

PROFILE	HEIGHT	TYPICAL PIPE DIAMETER	TYPICAL STEEL GAUGES	
126 - 20RS	20	450 - 1500	0.55, 0.7, 0.9, 1.2	mm
91 - 25RS	25	900 - 2500	0.7, 0.9, 1.2, 1.5	mm



The winding machine winds the PVC profile to form a liner

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