TRENCHLESS ASIA 2026
THAILAND

TRANSFORMING AGING PIPELINES WITH INNOVATION

MR. FAIZ AHMAD

SEKISUI SINGAPORE

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SEKISUI

Transforming Aging Pipelines with Innovation

Sekisui's Trenchless Spiral Pipe Method

Machine Wound Spiral Lining (MWSL)

Agenda

- Introduction to Sekisui
- Dysfunctional Sewers and Issues
- Introduction to MWSL Technology
  SPR-EX and SPR-ST
- MWSL Design and Technical Information
- MWSL Case Studies

Introduction of Sekisui

Name	SEKISUI CHEMICAL CO., LTD.
Establisment	March 3, 1947
Pide-up Capital	JPY 100,002
President	Ikusuke Shimizu
Number of Enployees	26,900 (for the term ending March 2025; on a consolidated basis)
Net Sales	USD 8.65 billion (for the term ending March 2025; on a consolidated basis)
Ordinary Income	USD 740 million (for the term ending March 2025; on a consolidated basis)
Corporate Headquarters	Osaka Head Office 2-4-4 Nishitenma, Kita-ku, Osaka 530-8565 Japan Tel: +81-6-6365-4122 Tokyo Head Office 2-3-17 Toranomon, Minato-ku, Tokyo 105-8450 Japan Tel: +81-3-5521-0521
URL	http://www.sekisuichemical.com

Osaka Head Office

Tokyo Head Office

Introduction of Sekisui

Sekisui portfolio

3 Business Units

Housing and Environmental Infrastructures

Housing

Refurbishing

Real Estate Business

Interiors and Exteriors

HOUSING COMPANY

Water Infrastructure

Pipe restoration

Housing Materials

URBAN INFRASTRUCTURE & ENVIRONMENTAL PRODUCTS COMPANY

Chemical Solutions

Plant Pipes

Performance Materials

Automotive Materials

IT Related Materials

Medical Products

Functional Materials

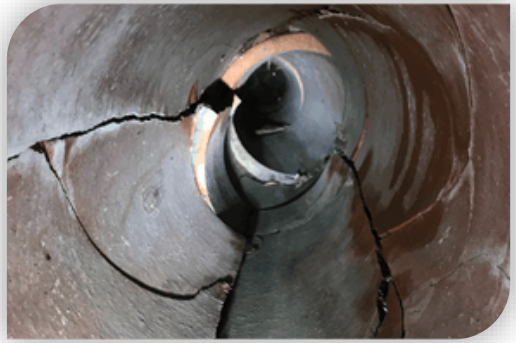
HIGH PERFORMANCE PLASTICS COMPANY

Common Problems of Existing Gravity Pipes

Aging pipes

Corrosion due to gas attack

Tree root intrusion



Misaligned and broken pipe sections

Infiltration

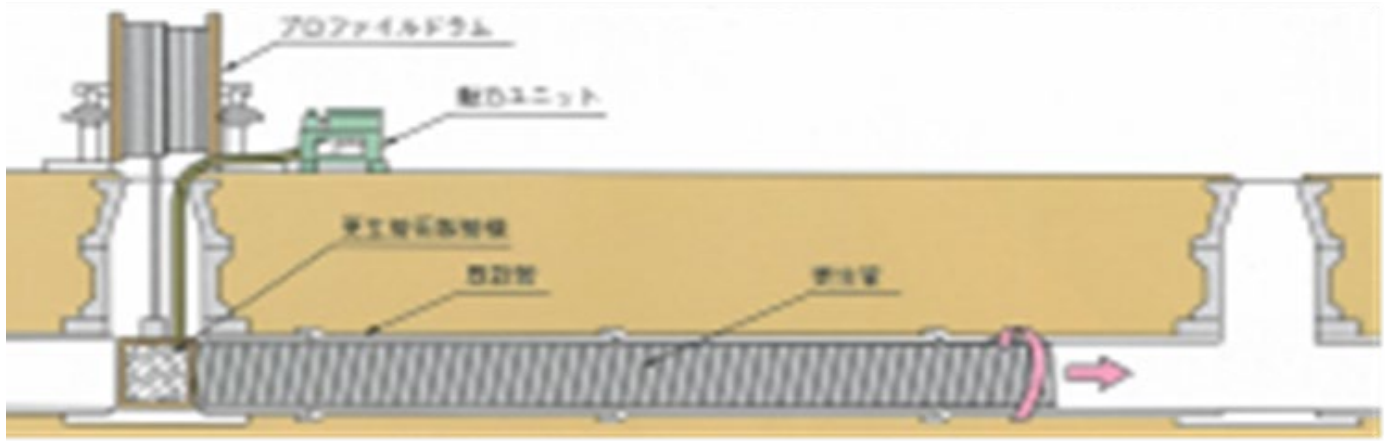
Road collapse

Benefits of Trenchless Pipe Rehabilitation

- ✓ Prevents sewerage leakage to sewers and canals
- ✓ Prevents soil and groundwater contamination
- ✓ Improve health condition and environment
- ✓ Prevent accidents
- ✓ Minimize inconvenience to communities
- ✓ Increase life span of pipe

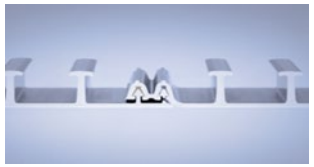
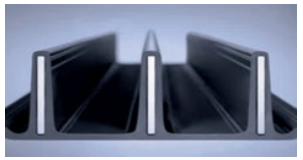
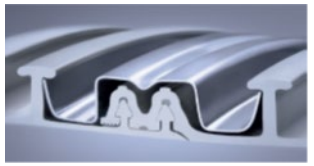
What is Sekisui MWSL Lining?

- **Spirally-wound pipe** is a pipe formed by continuously winding and joining a profiled plastics strip, or a profiled plastics strip and integral locking joining strip
- **Machine Spiral Wound Lining** is the fabrication of such a pipe to line a deteriorated host pipe or conduit by means of a specially designed winding machine
  - Such machines may be stationary - set up within an existing access chamber to push a spirally wound liner, or
  - May traverse a deteriorated host - fabricating the liner as the machine travels along the line.



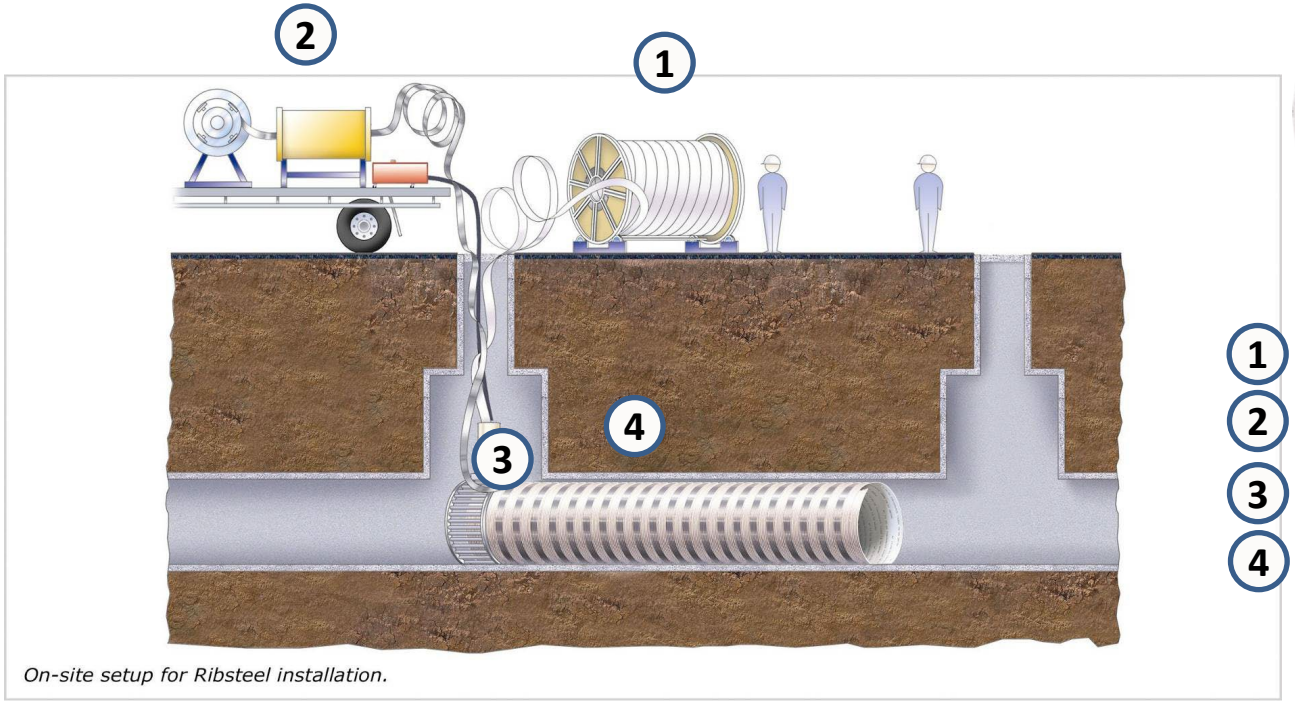
What is Sekisui MWSL Lining?

Sekisui Product Range

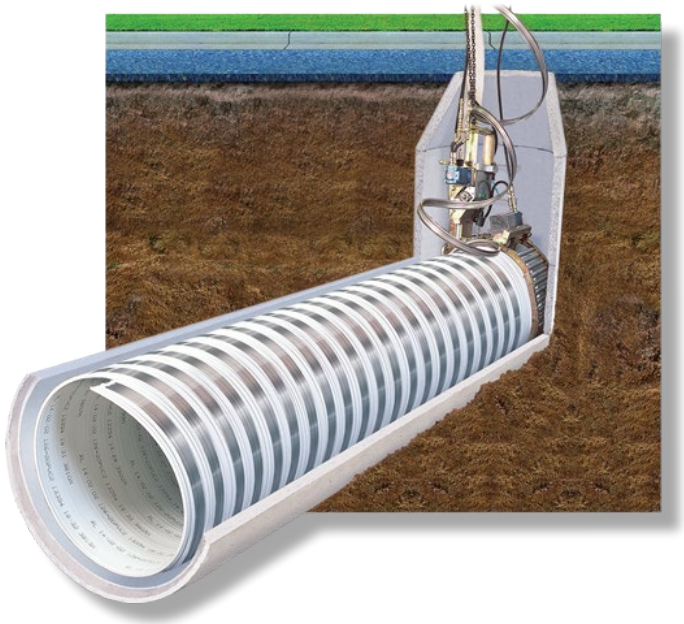
	SPR™	SPR™ EX	SPR™ PE	SPR™ ST
Profiles				
Diameter	800 – 5000 mm	150 – 750 mm	900 – 3000 mm	450 – 2500 mm
Material	PVC	PVC	HDPE	PVC
Shape	Circular Non circular	Circular	Circular	Circular
Adoption	Fixed Diameter	Close fit	Fixed Diameter	Fixed Diameter
Grout	High Strength Cementitious Mortar	-	Low Strength Cementitious Mortar	Low Strength Cementitious Mortar

SPR-ST (MWSL) - Winding Systems

Applicable diameter range
(600mm – 3500mm)



On-site setup for Ribsteel installation.



1. Profile Spool
2. Roll Former & Steel Coil
3. Winding Machine
4. SPR™ ST Liner

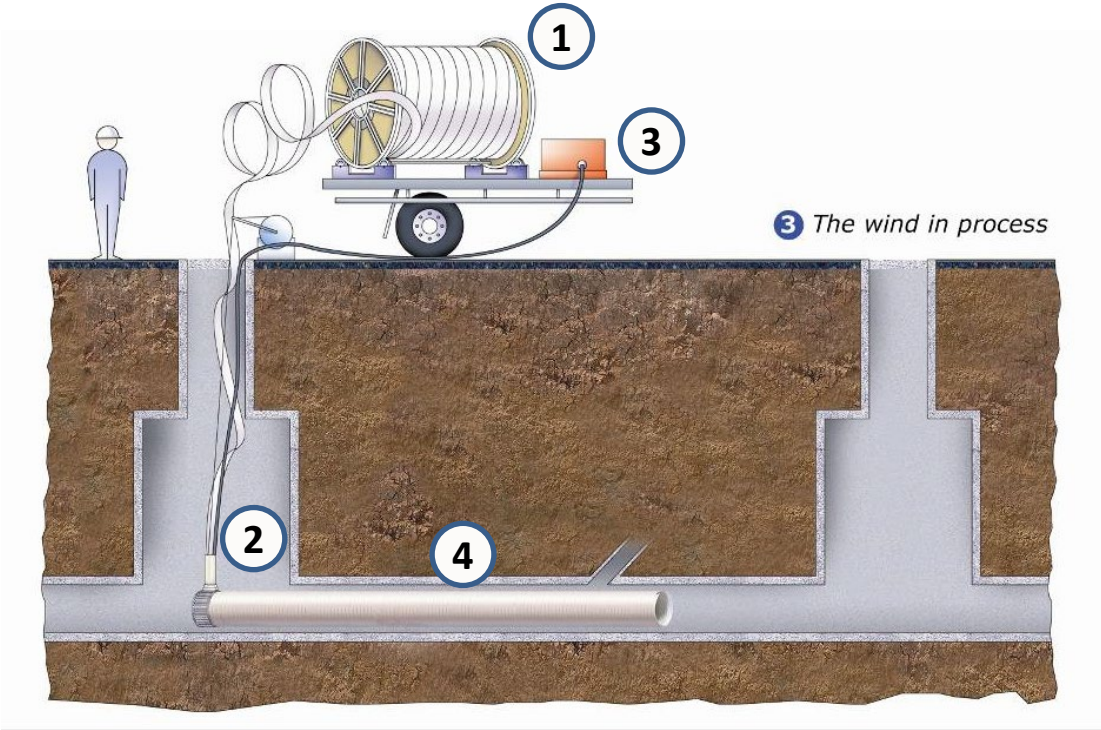
SPR-ST (MWSL) - Winding Systems

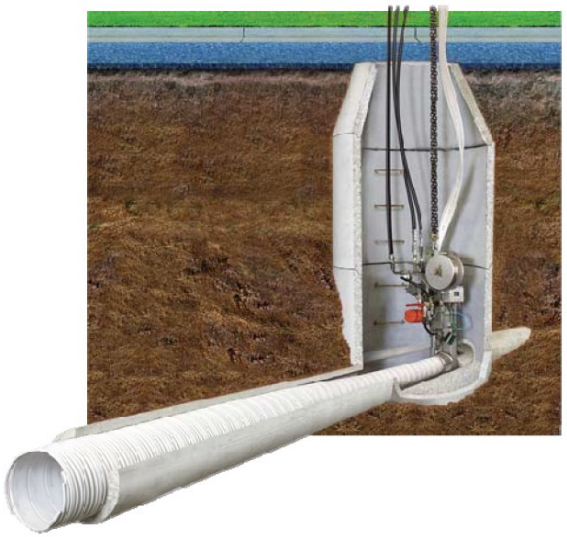
- ✓ Diameter range: 600-3500mm and more
- ✓ First project in 1997
- ✓ Installed from existing access chamber
- ✓ Liner can be steel reinforced to increase stiffness if required
- ✓ Liner installed at a fixed diameter
- ✓ Liner diameter can be customized on site
- ✓ Annular space grouted

SPR-ST (MWSL) - Introduction

SPR-EX (MWSL) - Winding Systems

Applicable diameter range
(150mm – 1050mm)





1. Profile Spool
2. Winding Machine
3. Generator, Hydraulic Power Pack, Sealant Dispenser, etc.
4. SPR™ EX Liner

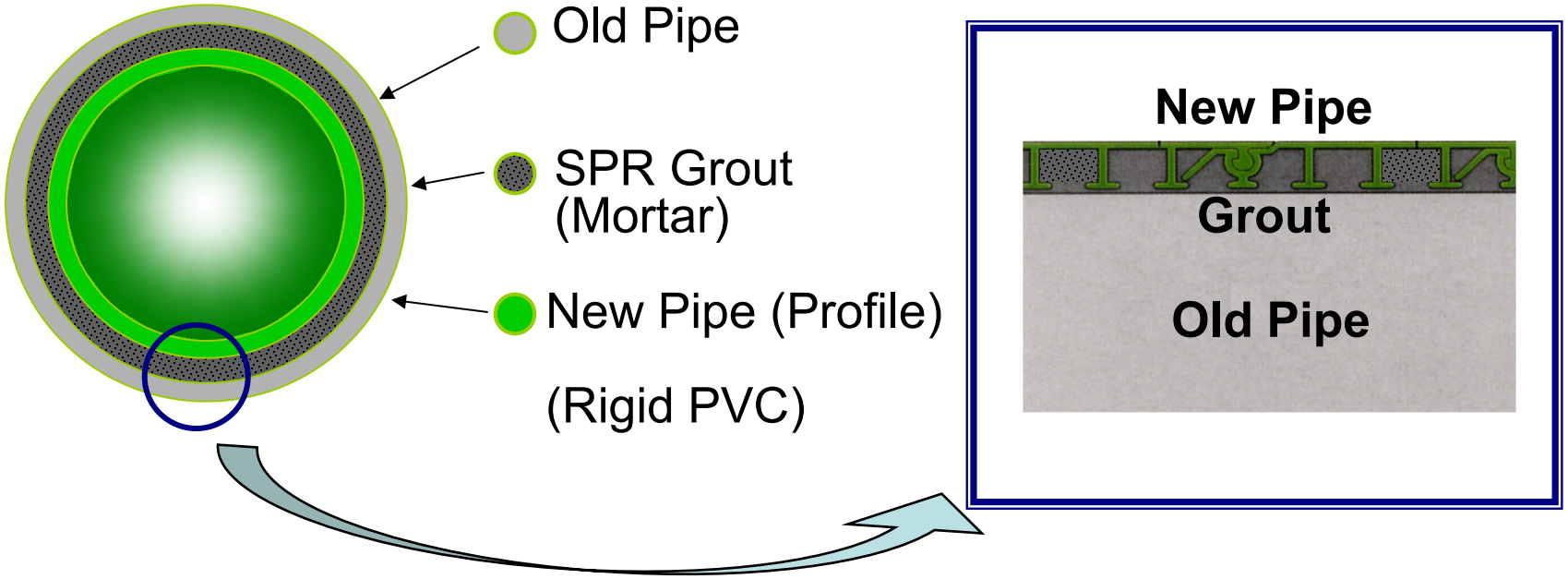
SPR-EX (MWSL) - Winding Systems

- ✓ Diameter range: 150-1050mm
- ✓ First project in 1990
- ✓ Over 700,000m installed
- ✓ Installed from existing access chamber
- ✓ Expanded in diameter during installation to form full bore structural liner

SPR-EX (MWSL) Video

SPR™ - Winding Systems

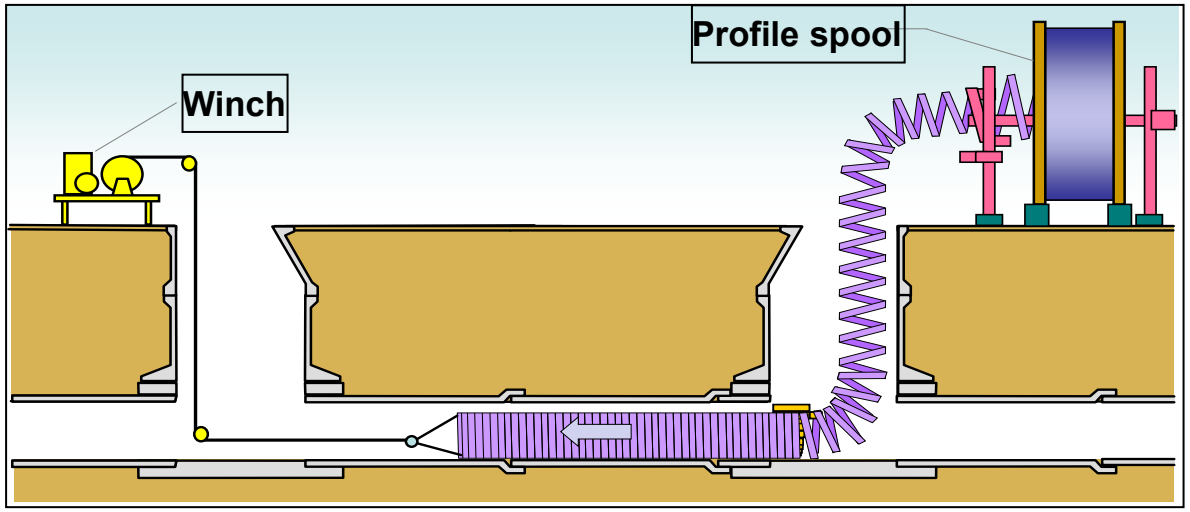
1. SPR is a double locked spirally wound rigid PVC liner formed inside an existing pipe and grouted into place.
2. The new SPR liner increases the flow capacity up to 30% due to its excellent flow coefficient and smooth surface.



SPR™ - Winding Systems

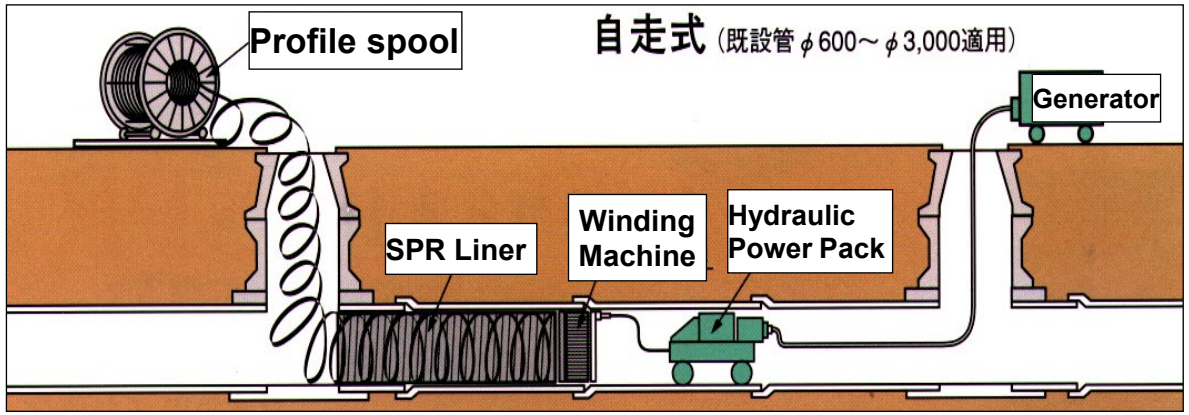
Pushing System

(375mm – 900mm)

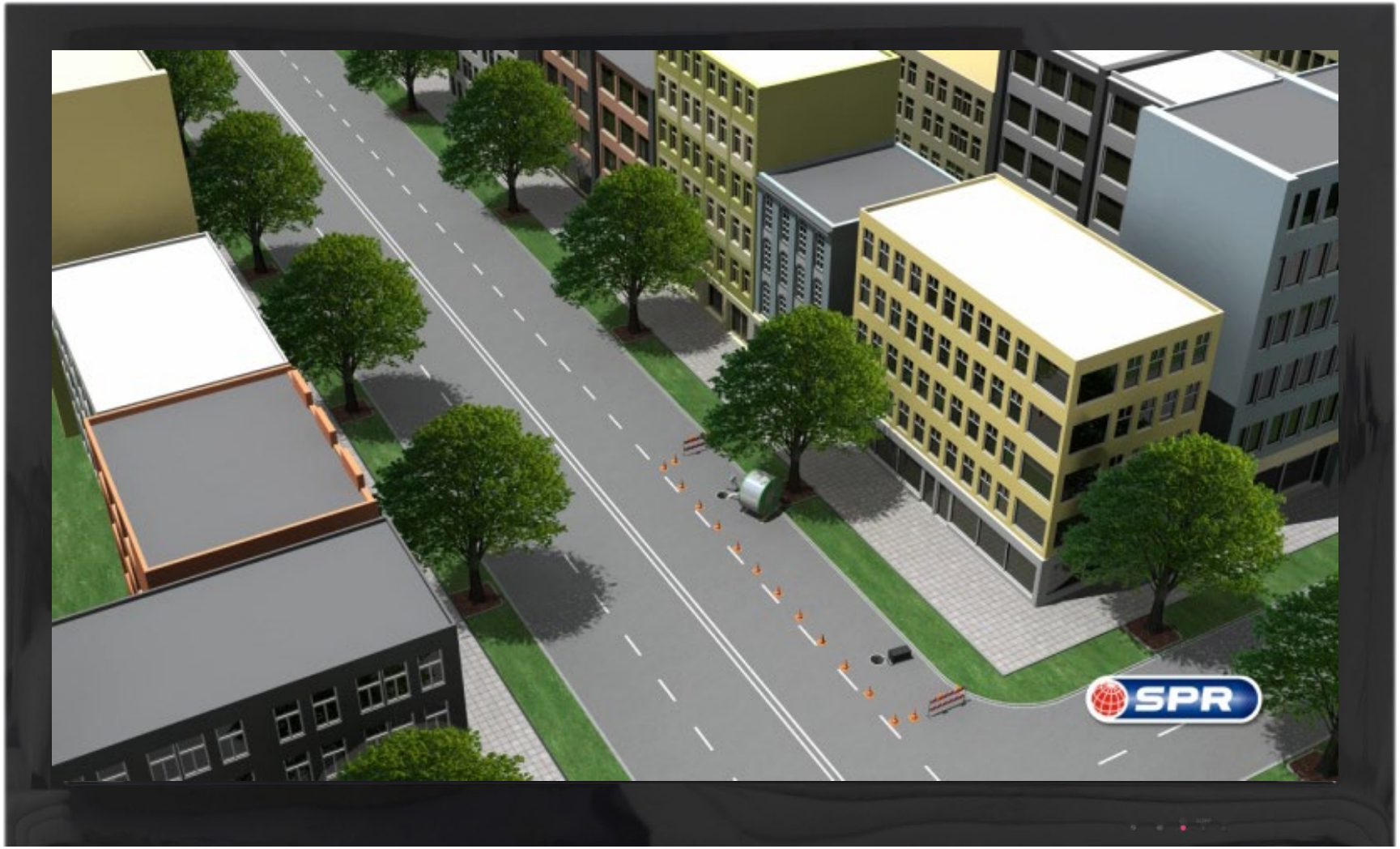


Self-winding System

(800mm – 5000mm)

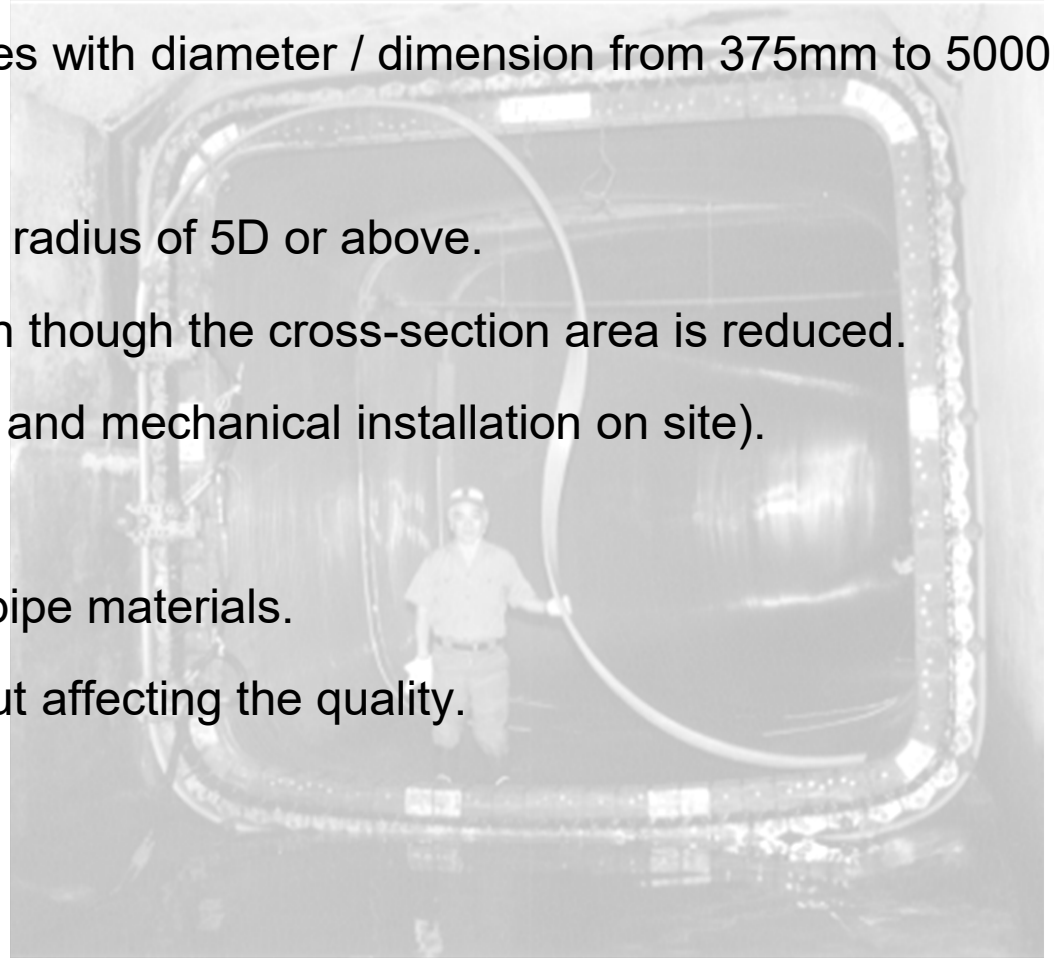


SPR™ - Presentation

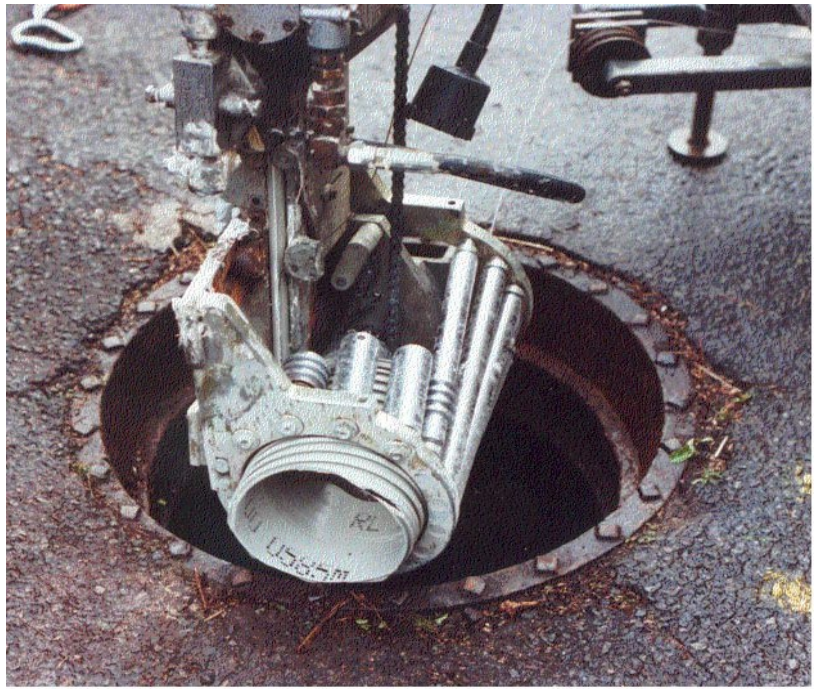


Advantages of SPR™ Technology

- Applicable to circular and non-circular pipes with diameter / dimension from 375mm to 5000mm.
- Can be installed in live flow conditions.
- Negotiates longitudinal bends & curvature radius of 5D or above.
- Flow capacity of the pipe is improved even though the cross-section area is reduced.
- Consistent quality (manufacture in factory and mechanical installation on site).
- Existing entry points can be used.
- Can be installed in a wide variety of host pipe materials.
- Installation can be stopped anytime without affecting the quality.



Equipment on Site



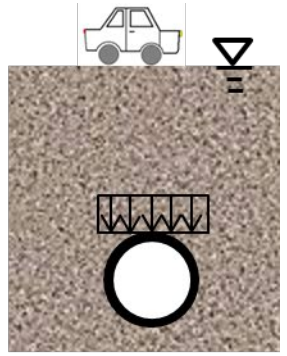
Equipment fits through standard maintenance holes

SPR™ EX and ST-Design Concept

SPR™ Ex and ST design is in accordance with the equations within ASTM F1741 Fully Deteriorated Pipe and Partially Deteriorated Pipe Design.

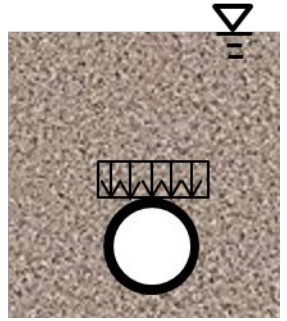
Fully Deteriorated Design

Designs examine the buckling resistance of the liner to all applied loads (soil, traffic, hydrostatic and dead loads), in addition to the buckling resistance to only the hydrostatic loads.



Partially Deteriorated Design

Design examine only the buckling resistance of the liner to the hydrostatic loads applied by the water table.



Advantages of Sekisui MWSL Technology

1.Live Flow Installation and Fully Structural Pipe

- Can be carried out in live flow conditions and the lining work can be stopped at any time without affecting the quality of liner.
- Can restored the existing deteriorated pipe to full structural strength

2. Installation speed & Improved Hydraulics

- High installation speed can be attained due to the liner being manufactured off-site, as well as the installation of the profile using a mechanical winding process rather than a chemical or heat-based process.
- Flow capacity of rehabilitated pipe is improved

3. Fully NO Dig Solution

- Eliminate the need for excavation.
- work can be carried out from the access chamber.

During installation

Advantages of Sekisui MWSL technology

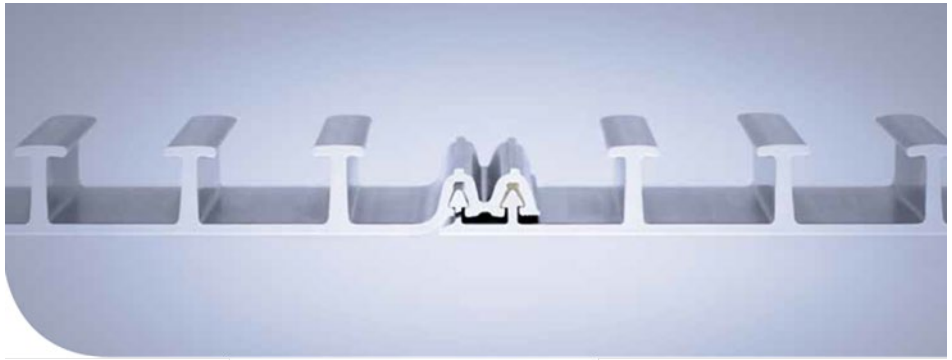
4. Minimal Flow Bypass

- MWSL lining can be done in live flow conditions hence the need for flow diversion is negligible or very less thus saving precious time and costs

5. Consistent Quality

- Sekisui MWSL profile are manufactured in an ISO 9001 certified facility and the factory manufactured profile is mechanically installed on sit

Profile extrusion



SPR-ST profile

Machine Spiral Wound Lining Standards, Approvals

- **Standards**
  - **ASTM F1741** – “Standard Practice for Installation of Machine Spiral-Wound Poly(Vinyl Chloride) (PVC) Liner Pipe for Rehabilitation of Existing Sewers and Conduits”
  - **ASTM F1697** – “Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Strip for Machine Spiral-Wound Liner Pipe Rehabilitation of Existing Sewers and Conduit”
  - **ISO 11296-7** – “Plastics piping systems for rehabilitation of underground non-pressure drainage and sewerage networks – Part 7: Lining with spirally-wound pipes”
- **Approval examples**
  - All Sekisui Rib Loc Australia products are **WRc Approved**
  - Covered by LACDPW **Greenbook** Standard Specifications in USA

Long Term Water Tightness Test

Testing Objectives

- The purpose of this test was to determine the long-term leak-tightness performance of Sekisui Rib Loc liner.
- Australia's (SRLA) Machine Spirally Wound Liner (MSWL) systems.

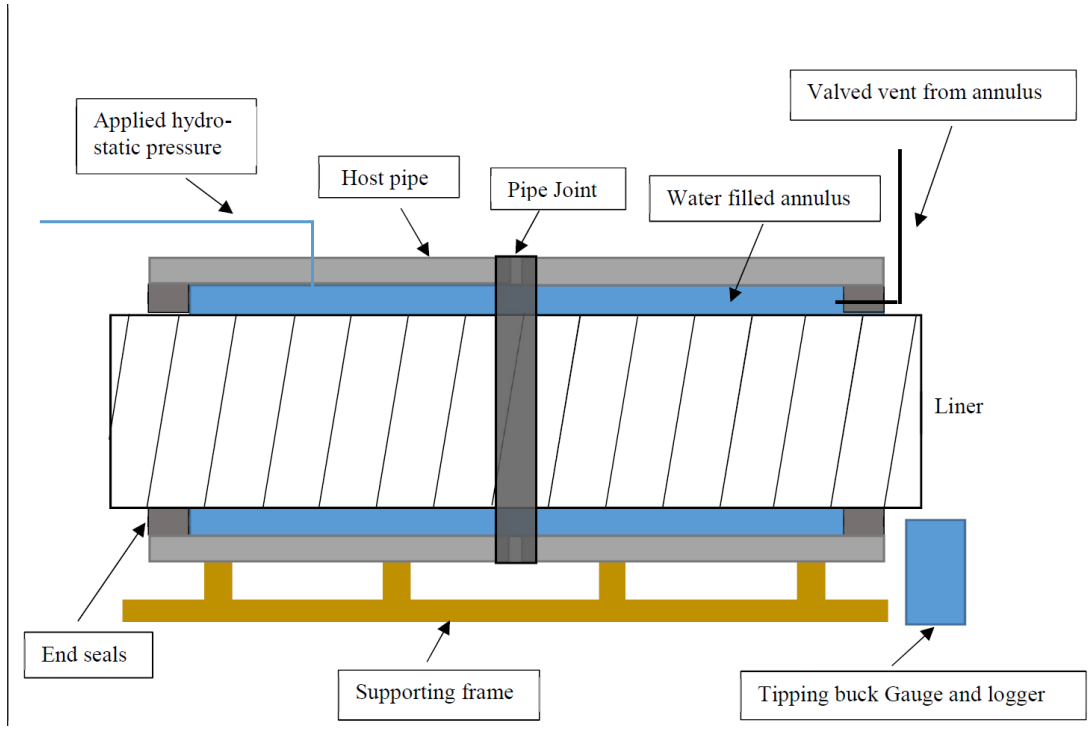
Liner Systems under Test

- The following Water Research Centre Limited (WRc) approved system was within the scope of the testing:
- SPR™ EX, WRc approved certification PT 372/0715.

Parties and Role

- SRLA responsible for the test sample manufacture, test configuration set-up and monitoring of the test.
- Bureau Veritas Asset Integrity and Reliability Services Pty Ltd (BV) independent verification of the testing (BV's
- report is included in Appendix 2).
- WRc develop of test procedure and criteria, review of audit/test submissions and issue of statement.

Long Term Water Tightness Test



Product	Profile type	Diameter (OD, mm)	Length of liner (mm)	Host pipe material	Host pipe diameter (ID, mm)	Installation Date	Remarks
SPR™ EX	126-20EX	450	5510	Reinforced Concrete	450	16/05/2019	Close-Fit

Table 1 – Test sample details

Long Term Water Tightness Test

Inspection of Sample Liner: 126-20EX

Date/ Time	Visual inspection of liner wall for infiltration	Visual inspection for external leak of end seal and fitting	Hydrostatic Pressure (kPa)	Hydrostatic Head (m)	Ambient temp (°C)	Rain gauge spike (200ml)	Comments
18/7/19 9:00am	None	No Leak	54.0	5.8	12	No	Start of test*
14/8/19 12:15pm	None	No Leak	55.9	5.7	13	Yes	Testing inspected
27/8/19 10:15am	None	No Leak	56.6	5.8	10	No	Testing inspected *
5/9/19 10:30am	None	No Leak	56.5	5.8	18	Yes	Testing inspected *
3/10/19 9.25am	None	No Leak	55.1	5.6	20	Yes	Testing inspected *
12/11/19 1:30pm	None	No Leak	55.2	5.5	27	No	Testing inspected *
21/11/19 2:50pm	None	No Leak	53.2	5.5	22	No	Testing inspected
24/1/20 1:00pm	N/A	N/A	N/A	N/A	N/A	N/A	Test was completed

Table 2: Inspection data for sample liner 126-20EX (*See pages 6 - 8 for pressure gauge and data log photos)

Sekisui MWSL Rehabilitation Technology






Case Study - India

- **Project Overview**
  - **Client:** Panchkula Metropolitan Development Authority
  - **Location:** Geeta Chowk to Town Park, Panchkula
  - **Line Details:** DN 900 mm stormwater drain | 700 meters
  - **Technology:** Sekisui SPR-ST (Spiral Wound Lining)

- **Challenge & Opportunity**
  - **Structural Risk:** Routine CCTV inspection revealed an aging pipeline with severe structural degradation, posing a proactive public safety risk.
  - **Urban Constraints:** Required an efficient rehabilitation solution that could adapt to live flow conditions without extensive open excavation.
  - **Market Momentum:** This project establishes SPR-ST as a preferred trenchless technology for stormwater networks across Haryana state.

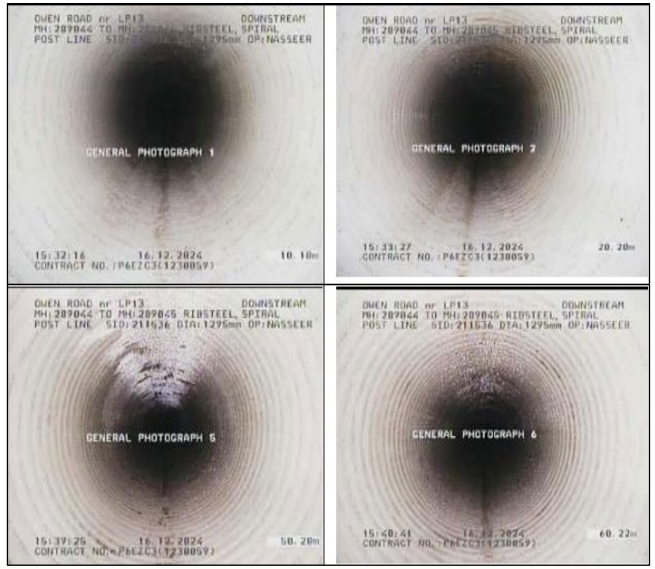
- **The Solution & Operational Footprint**
  - **Trenchless Execution:** Structural PVC liner spirally wound directly into the host pipe via a compact winding cage system, fully restoring structural integrity.
  - **Live Flow Adaptability:** High-efficiency installation safely completed under live flow conditions with no structural defects or misalignments.
  - **Minimal Disturbance:** Low noise generation and an ultra-small asset footprint allowed for continuous day and night operations without disrupting local traffic.
- **Key Outcomes**
  - **Flawless Delivery:** 100% of the 700-meter section successfully lined; post-work CCTV surveys confirmed a perfectly tight, uniform fit.
  - **High Client Satisfaction:** Authority representatives observed the process firsthand and commended the rapid installation and minimal surface footprint.
  - **Sustainable Infrastructure:** Proven capability establishes a highly scalable model for sustainable infrastructure management across Indian municipal bodies.

Case Study - Singapore

- **Project Overview**
  - **Client:** Public Utilities Board (PUB)
  - **Location:** Owen Road, Singapore
  - **Application:** Sewer Rehabilitation by Trenchless Technology (MWSL)
  - **Year:** 2024
  - **Product:** SPR-ST
  - **Length:** 119.28 meters
  - **Diameter:** DN 1295 mm

- **Project Description**
  - During a routine CCTV survey inspection conducted by the relevant authority, a 1,295 mm diameter sewer pipe located along Owen Road, Singapore, was found to be in a severely deteriorated condition. The inspection revealed a broken crown and multiple cavity formations above the pipe at various points along the 119.28-metre sewer line. Originally constructed in 1941, this aging sewer required urgent rehabilitation to prevent further structural degradation and eliminate any proactive risk to public safety.

- **The Opportunity**
  - SPR-ST and SPR™ are preferred trenchless technologies that have been successfully adopted in large-scale infrastructure projects by Singapore's Public Utilities Board (PUB) since the late 2000s. This specific section represents a critical component of a larger 5 km sewer rehabilitation initiative dedicated to strengthening and improving the nation's underground infrastructure.
- **The Solution**
  - In Singapore, sewer lines with diameters exceeding 600 mm are categorized as big-diameter sewers, making the Spiral Wound Lining SPR-ST method the standard choice for structural rehabilitation. The process involves winding interlocking PVC strips and steel reinforcement in a spiral pattern using a specialized winding cage.
- **The Outcome**
  - Following the completion of the trenchless rehabilitation works, a detailed post-work CCTV survey was conducted as a final quality assurance inspection. The internal camera verification confirmed that the structural integrity of the rehabilitated sewer met all mandated engineering standards, showing a smooth interior with absolutely no remaining defects, misalignments, or blockages.



Certification (WRc Approval)

- ✓ These independent assessments cover:
- ✓ Material quality audit.
- ✓ Review of quality system.
- ✓ Product testing.
- ✓ Structural design (to ASTM 1741)
- ✓ Audit of installation instructions
- ✓ and site installation

Product Certificate

This is to certify that the following product has met the requirements detailed below

SPR™ EX Lining System

For the manufacture and supply of lining strip and associated winding equipment for the renovation, using spirally-wound pipes, of circular gravity sewers with diameter range 150 mm to 1050 mm.

Sekisui Rib Loc Australia Pty Ltd
587 Grand Junction Road
Gepps Cross
Adelaide 5094
South Australia

This product meets the requirements set out in WRc Assessment Schedule PT/465/0720-AS.

Assessor I C A Adams
Director
Issue Date 31/07/2020
Expiry Date 31/07/2025
Certificate Number PT/465/0720

wrc approved

Product Certificate

This is to certify that the following product has met the requirements detailed below

SPR™ ST Lining System

For the manufacture and supply of lining strip and associated winding equipment for the renovation, using spirally-wound pipes, of circular gravity sewers with diameter range 450mm to 2100mm

Sekisui Rib Loc Australia Pty Ltd
587 Grand Junction Road
Gepps Cross
Adelaide 5094
South Australia

This product meets the requirements set out in WRc Assessment Schedule PT/464/0720-AS.

Assessor I C A Adams
Director
Issue Date 31/07/2020
Expiry Date 31/07/2025
Certificate Number PT/464/0720

wrc approved

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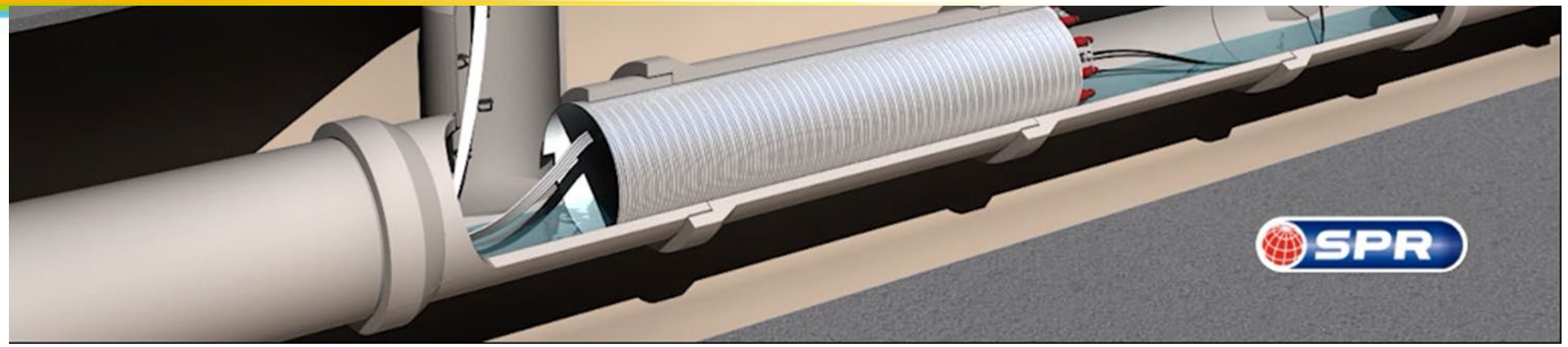
Thank you



Global Connections