

# RELINE & REHABILITATION OF SERVICE PIPELINES



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## ABSTRACT

This paper provides an overview about innovative no-dig technology, applied for customers of 'us' – Utility Services to deliver tomorrow's solution for today's challenges by satisfying demands and expectations on commercial, environmental, communal and OHS issues.

The main areas of definition will focus mainly on:

- Introduction of technology
- Performance criteria
- Results and benefits
- References and achievements

## 1.0 INTRODUCTION

**InnaTube** is a versatile service pipe lining system, offering a cost-effective solution for the renovation of service pipes, from 12mm (3/8") to 40mm (1 1/2") in diameter, suffering from water quality problems and/or water leakage.

InnaTube is particularly suitable where alternative solutions prove to be disruptive, such as long side service connections involving road crossings, congested ground and customer service pipes under drives, fencing, gardens, etc. Based on lining existing pipes with a PET tube (Polyethylene Terephthalate), same material used for plastic drink bottles, InnaTube eliminates contact between the host pipe and the drinking water, providing an immediate effective barrier against contamination from metal-based pipe material and sealing from within any minor cracks and holes in the bonding process.

InnaTube is most commonly used when conventional techniques, such as moling and open cut are not suitable, for example in congested ground or when service is passing through tree roots. It can also be used in a variety of water and gas applications, as a lining system for lead, steel, copper, galvanized iron, alkathene and poly.

The system has been fully evaluated at the manufacturers marketing and technology centre in Europe to establish the operational and long-term performance characteristics being certificated under British Standards, ISO 9002: 1994 and also obtained DWI approval for potable water use in the UK and other key European countries.

Further endorsement/approval from WSAA in Australia is in progress.



## 1.1 STAGES OF APPLICATION

### Stage One –

The mains / ferrule connection is excavated for the launch pit (only dig required).

Disconnection at customer property (water meter) or other nominated termination point is performed to have single line service accessible.



### Stage Two –

The existing service is cleaned and dried using foam plugs (swabs) and compressed air. This will also establish if the service liner medium can be fed through the host (old) pipe. Clogged or squashed pipes can not be relined and other more traditional methodologies have to be applied.

### Stage Three –

Determine the approximate size InnaTube liner for the existing service. Push-pull the PET material liner from launch to receiving end. Using the appropriate diameter adaptor fittings, connect the liner tube to the hose connectors of the system.



### Stage Four –

Starting of the InnaTube unit will circulate heated water through the liner tube until a return temperature of 82 degrees C is detected. Automatic pressurizing to 5.5 bar expands the InnaTube liner to form a close fit. Compressed air is used to evacuate the water and cool the liner to 60 degrees C. The expansion and cooling cycle is completed automatically.

Remove the temporary connections to the hoses and reconnect the lined service to the mains using compression fittings / flared pipe ends.



## 2.0 PERFORMANCE CHARACTERISTICS

An InnaTube lined service pipe is reduced in bore by 0.5mm on average, however two factors affect the flow in a positive way to balance the reduction in bore diameter. Firstly, the process of cleaning the existing service removes any loose deposits and marginally increases the available bore for lining. Secondly, and more of importance, the roughness co-efficient on InnaTube is significantly lower than any aged service pipe material. Services regularly suffer from corrosion and leaking joints. The long term strength of InnaTube is comparable to PVC and can resist a pressure of 8 bar for 50 years. The expanded liner does span holes, cracks and gaps without affecting the performance of the service. The max hold spanning capability is about 1.5 times the liner diameter, ie. 10mm pipe to cover 15mm hole

The liner is available in 6, 7 and 10 mm sizes (15 and 20mm available on request).

A typical planned pipe relining from arrival / preparation to completion / departure is about 2-3 hours with 'water off' time reduced to less than 90 minutes. Apart from an access pit at the ferrule/mains connection point, no disturbance to the environmental surroundings is taking place. Therefore leaving no chance to potential damage to other authority assets, customer property, trees or road surface. Impact on local traffic and administration effort is greatly reduced as well. Being faster with least engagement of machinery does not only satisfy the end-customer satisfaction, it delivers cost reductions with significant impact. Drinking water quality is as per mains delivery and existing water losses through leaks are permanently fixed for good. Operators of this technology value the ease of application, learning about new ways to deal with existing problems, receiving positive customer comments and reduction of potential work related injuries due to back strains from digging, extensive preparations.

Equipped service trucks are usually operated by a crew of two operators with the scheduling being subject to known site specifics like:

- Proven quality complaints
- Record of prior service works, ie. leaks
- Access and local impact issues, ie. traffic, trees
- Economics and longevity, ie. as part of mains renewal
- Greater risk of damage to other services
- Geographic's and condition of site
- Impact and needs of end customer

### 3.0 RESULTS AND BENEFITS

With this technology now being utilized over the past 18 month on infrastructure networks of South East Water and other metropolitan and regional water utilities, over 400 service pipe renovations have been done for pipe diameter <45mm.

It forms an integral part of a complete value proposition for the network operator, encompassing the detection of problem areas through leak detection and water sampling, until fixing and extending the asset service life performance.

Essential key performance influencers are:

- Minimum disruption to water supply services (60-90min) positively impacts on customer satisfaction
- Immediate cure to water quality problems takes place
- Relining rate of services is well above traditional methods
- Multiple applications on any type of host pipes and fittings are possible
- Excellent technical properties by forming impermeable barrier with minimum effect on overall flow rates
- Environmental friendly due to minimum dig and no use of chemicals.



### 4.0 REFERENCES

**South East Water**, *Melbourne water retailer*

In excess of 350 installations performed throughout the entire geographical spread within different councils and site specifics.

Complementary to leak detection program and limited environmental impact in tree-lined nature strips.

**Sydney Water, Metropolitan Sydney**

Ongoing relining works to bitumen-lined galvanized iron pipes throughout inner and outer Sydney suburbs.

Application of technology takes place in twenty-six countries throughout Europe and licensee arrangement made in a further forty countries worldwide.

**Our operators** who apply and work with this technology are very keen and enthusiastic about the difference it makes to their job and contribution being made to the asset performance.

**Our customers** who enjoy better water quality and less impact on their supply performance.