



Document No	DS-D001
Issue No	1
Issue Date	1/12/22

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# **Specification: Design for Structural Renovation of Pipelines by Internal Lining**

## **Part 1 – Circular Non-pressure Pipelines**



Document No	DS-D001
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## REVISION REGISTER

Issue No.	Date	Description
1	1 December 2022	Initial issue from ASTT

Note: It is the intention of the SIG that this Specification will be reviewed and reissued within an approximate 2-year time period from original issue date above. Comments and/or suggested amendments should be sent to [secretary@astt.com.au](mailto:secretary@astt.com.au).



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## PREFACE

The value of trenchless technology, not just in cost savings but in societal benefits, has seen an increasing uptake of technologies over the past two decades. Amongst the technologies being used by asset owners is the structural renovation of non-pressure pipelines. These renovation works are often specified to be designed in accordance with AS/NZS 2566.1, Buried flexible pipelines - Part 1: Structural design. Although this standard is perhaps the most relevant standard to be used, it does not specifically cover the design of lining systems used to renovate existing pipes; hence the need for a design Specification.

The ASTT continues to work with Standards Australia to update the standard to include pipe liner design; this process can however take years to realise an outcome. The Australasian pipe lining industry, notwithstanding that there has not been any serious liner design issue over the past decades, recognizes the need for a design standard, to ensure the high quality standards and reputation of the technology and techniques remain. Asset owners require confidence that any asset renovation meets their expectations and return on investment criteria. Whilst design alone does not guarantee the final product, quality installation workmanship is required, it is a critical element to the final output.

Through the ASTT initiative of Special Interest Groups (SIGs) a pipelining SIG, including membership from asset owners, trenchless technology consultants, pipelining installation contractors and material suppliers, was formed. The SIG and its members represent the Australasian pipe lining industry and includes for collectively hundreds of years' experience in pipelining. It is this representation and experience that has developed these design Specifications.

The Specification has been prepared with the Australasian Industry as its intended audience and users. The SIG agreed very early on to use AS/NZS 2566.1 as the underlying basis for the Specification but recognized those other national and international standards, e.g., ASTM and ISO, covered aspects of the same pipeline renovation area. These were considered and used, where appropriate and applicable. The Specification should therefore be consistent with many existing Client documents already used but improved and with more detail.

The pipelining industry is evolving at a fast pace. New techniques and materials are constantly being developed and entering the marketplace. The Design Specification is not intended to cover every situation. It has been developed around meeting the needs and requirements for the majority of all circular, non-pressure, pipe lining situations. Asset owners and designers using the Specification still need to apply best engineering judgment in its application. If there is uncertainty, specialized knowledge should be engaged.

The ASTT, as the industry advocate, hopes that the Australasian pipe lining industry, asset owners; consultants; suppliers; and contractors, uptakes the use of this design Specification. Only through its use can learnings and continuous improvements be made. It will continue to be reviewed and improved but again shows the world class leading initiative that Australasia offers in trenchless technology.

I thank everyone involved in the preparation of this document. We should all be proud of our achievement.

Blair Telfer

NZ Councillor, ASTT Vice President and SIG Chair



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## ACKNOWLEDGEMENTS

The Australasian Society for Trenchless Technology (ASTT) acknowledges the work of the pipelining SIG. This group comprises individuals from many backgrounds, including consulting engineering, pipe relining contractors, industry organisations, material suppliers and government authorities.

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## 1 INTRODUCTION

### 1.1 Scope

This Specification is relevant to the structural (Note 1) renovation of circular non-pressure pipelines including typical sewerage and stormwater applications up to and including 1200 mm internal diameter and for a host pipe depth up to 15 m depth to invert (Note 2).

*Note 1: This Specification only contains requirements for structural design and does not contain other design requirements such as chemical or abrasion resistance or hydraulics requirements.*

*Note 2: The information contained in this Specification may well be relevant to existing conduits larger or deeper than this Scope but other considerations may be required.*

The Specification only contains requirements for permanent design loads which will apply after installation and subsequent curing of the liner and/or grout if this is relevant. Other load cases and/or other load effects such as those involving ground settlement or localised buckling of some liners may need to be considered. Some guidance is provided in Section 6 with regards these additional requirements. The Specification does not provide guidance as to the suitability of specific liners or lining methods. Lining designers, contractors or suppliers need to satisfy themselves that the material and/or method is suitable for their specific application.

This Specification is relevant to full length liners extending typically between end structures such as maintenance holes or headwalls. The requirements may be relevant to short length or “patch liners” but other considerations, such as bond, which are not detailed in this Specification may be required.

These Guidelines are relevant to the following lining methods:

- Cured in Place Pipe (CIPP)
- Spiral Wound Lining (SWL)
- Fold and Form Lining (F&FL)
- Slip Lining

This Specification is suitable for design of liners which, due to the shape of the deteriorated host pipe, will have an expected ovality of less than or equal to 10% when installed. It is suitable for circular grouted liners in all types of host pipes, but loss of hydraulic capacity may need to be considered.

Notes contained in this Specification are provided for guidance and explanation only and are not considered to be a mandatory requirement. Notes to Tables however are mandatory. Any references to Tables, Notes, Figures or Equations in this Specification are relevant to this Specification unless noted otherwise.