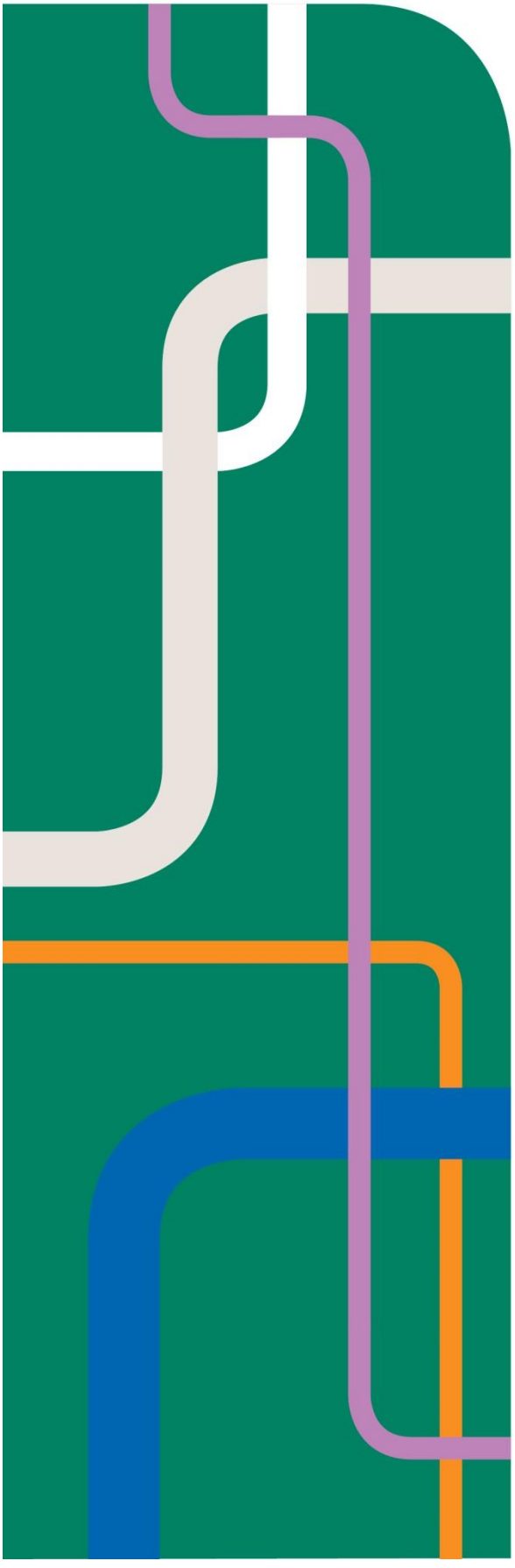
Government of South Australia

SA Water



Engineering Services

Technical Standard
TS 18

Protection of Buried Pipework

Revision: 1.0
Date: 10 February 2016

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Application & Interpretation of this Document

It is the responsibility of the users of this Standard to ensure that the application of information is appropriate and that any designs based on this Standard are fit for SA Water's purposes and comply with all relevant Australian Standards, Acts and regulations.

Users of this Standard accept sole responsibility for interpretation and use of the information contained in this Standard. Users should independently verify the accuracy, fitness for purpose and application of information contained in this Standard.

Only the current revision of this Standard should be used which is available for download from the SA Water website.

Significant/Major Changes Incorporated in This Edition

This is the first issue of this Technical Standard, it is a compilation of: TS 13, TS 29 and TS 81. The following changes have been made:

1. Generalisation of standards to cover all repair coatings for steel pipes and structures.
2. Format changes to improve readability.

Document Controls

Revision History

Revision	Date	Author	Comments
1.0	10 February 2016	Paul Vince	

Template: Technical Standard Version 4.00, 02/11/2015

Approvers

Role	Signature and Date
Responsible Discipline Lead Paul Vince	18/02/2016 X  Signer's Name Signed by: VI001924
Manager Engineering Technical Services Murat Aksoy	23/02/2016 X  Signer's Name Signed by: AK003305
Senior Manager Engineering Services Richard Gray	9/03/2016 X  Signer's Name Signed by: GR001964

Reviewers

Role	Name	Revision	Review Date

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No Figures in Standard.

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1 Introduction

SA Water owns and operates an extensive amount of infrastructure of which steelwork forms a significant component.

This Technical Standard has been developed to assist SA Water to maintain, manage and protect buried steelwork.

This Standard shall be read in conjunction with the manufacturer's technical data sheets and specifications. Where details are not included in this Standard products shall be applied in accordance with the manufacturer's written instructions.

1.1 Purpose

The purpose of this standard is to detail minimum requirements for coating systems to ensure steel assets are suitably protected and attain their required life.

1.2 Glossary

The following glossary items are used in this document:

Term	Description
ACA	Australasian Corrosion Association
NACE	National Association of Corrosion Engineers
SA Water	South Australian Water Corporation
TG	SA Water Technical Guideline
TS	SA Water Technical Standard

1.3 References

1.3.1 Australian and International

The following table identifies Australian and International standards and other similar documents referenced in this document:

Number	Title
AS 1627	Metal finishing - Preparation and pretreatment of surfaces
Part 1	Cleaning using liquid solvent and alkaline solutions
Part 2	Power tool cleaning
AS 3894	Site testing of protective coatings
Part 1	Non-conductive coatings - Continuity testing - High voltage ('brush') method

1.3.2 SA Water Documents

The following table identifies the SA Water standards and other similar documents referenced in this document:

Number	Title
TS 15	Protection of Steelwork in Immersed Conditions
TS 16	Protection of Steelwork in Atmospheric Environments

1.4 Definitions

The following definitions are applicable to this document:

Term	Description
SA Water's Representative	The SA Water representative with delegated authority under a Contract or engagement, including (as applicable): • Superintendent's Representative (e.g. AS 4300 & AS 2124 etc.) • SA Water Project Manager • SA Water nominated contact person
Responsible Discipline Lead	The engineering discipline expert responsible for TS 18 defined on page 3 (via SA Water's Representative)

2 Scope

This Technical Standard (TS) covers the surface preparation for application of and repair of buried steel pipes and fittings using:

1. Epoxy Coating System
2. Bitumen Mastic Coating System
3. Petrolatum Coating System

The products within each system are shown in Table 1.

Table 1: Specifications for Each Coating System

Coat Layer	Approved Product
Ameron Amercoat® CC703/2	
Bitumen Mastic Coating System	
Primer	Densopol® Primer D (Denso® 360)
Mastic	Denso® Bitumen Mastic Strip (Denso® 461)
Tape	Densopol® 60 Tape (Denso® 760)
PVC Overwrap	Denso® MP/HD Tape (Denso® 931)
Petrolatum Coating System - Denso®	
Primer	Denso® Multi purpose Primer (300)
Mastic	Denso® Mastic (400)
Tape	Denso® Tape (600)
PVC Overwrap	Denso® MP/HD Tape (931)
Petrolatum Coating System - PetroGard®	
Primer	PetroGard® Petrolatum Primer
Mastic	PetroGard® Petrolatum Mastic ST
Tape	PetroGard® Petrolatum Tape ST
PVC Overwrap	PetroGard® PVC Overwrap Tape

3 Product Selection

Unless the coating material is explicitly specified, Table 2 shall be used to determine the required coating. For steelwork in atmospheric or immersed conditions refer to TS 16 and TS 15 respectively. Note that the Petrolatum Coating Systems are exchangeable.

Table 2: Comparison of Protective Material Coatings

	Epoxy	Bitumen Mastic	Petrolatum
Can be applied to bare steel	✓	✓	x
Can be applied to Sintakote®	x	✓	x
Can be applied to cast iron and ductile iron	x	✓	✓
Can be applied to coal tar coated pipework	x	x	✓[1]
Can be used to repair brass fittings	x	x	✓
Requires abrasive blast cleaning	✓	x	x
Can be used with primer	x	✓	✓

4 Qualification

Applicators shall have completed appropriate competency based training (i.e. Denso® training course) approved by SA Water prior to the application of the authorised products. Note: this is not required for the Ameron Amercoat® CC703/2 Epoxy coating.

[1] With the approval of SA Water's Representative

5 Surface Preparation

Table 3 details the required surface preparation for the different wrapping systems, note that details for the Epoxy Coating System can be found in TS 15.

Table 3: Surface Preparation for Coating System

	Bitumen Mastic	Petrolatum
Surface contamination and oil removal	Steel surfaces shall be free from mill-scale, rust, weld-spatter, oil, grease, soil, moisture and any other matter likely to impair the adhesion of the coating. Oil and grease shall be removed from all steelwork using an alkali degreasing process or solvent washing as approved by accordance with AS 1627.1	
Surface contamination for coal tar pipework	N/A	Raised lumps shall be removed and any unsound coating cut back 20 mm into sound coating. All surface contamination shall be removed by wire brushing for a distance of 100 mm onto the original coating.
Surface Preparation for Pinhole defects	The damaged area shall be slightly roughened to a minimum distance of 50 mm using a coarse file or abrasive paper.	No further requirements
Surface Preparation for large, straight sections of pipework	Cut out the damaged area of Sintakote® and clean to AS 1627.2 Class St 2.	No further requirements
Surface Preparation for welds and bends	The fabricator shall ensure that all joints are fully welded and sealed, sharp edges and corners are ground off to a radius not less than 1.5 mm and all weld spatter and irregularities are removed. Any unsound or damaged edges of Sintakote® shall be cut back into sound coating and the edges chamfered.	No further requirements
After Surface Prep	All surfaces to be wrapped shall be wiped down using a clean dry rag to remove any moisture and remaining dust.	
Timing Requirement	Coating shall be completed on the same day as surface preparation.	

6 Application of Coating System

This clause details the application of the wrapping systems. The primer coat shall be applied as soon as the surface preparation has been approved by SA Water's Representative. Safety and application procedures shall be strictly in accordance with the manufacturer's written instructions.

6.1 Prior to Coating

Before beginning coating checking shall be undertaken to ensure that:

- Application of primer shall not commence until the surface preparation has been inspected and approved by SA Water's Representative.
- Commencement of primer application shall indicate unconditional acceptance of the surface to be wrapped.

6.2 Application of Bitumen Mastic

6.2.1 Straight Pipe Repairs

Prepare surface in accordance with Table 3.

Primer Application

Stir primer prior to application. Apply a thin even coat of primer onto the steel surface and around the periphery of the Sintakote®. Allow the primer to tack dry (approximately 10-20 minutes).

Mastic Filling

1. Cut out a piece of Bitumen Mastic Strip to fit into the bare steel area and place it in the repair area.

2. Re-apply a thin even coat of Densopol® Primer D over the patch and adjacent area of Sintakote®.

3. Allow the primer to tack dry.

Tape Wrapping

Apply Densopol® 60 tape to the repair area ensuring a minimum of 50 mm overlap onto sound coating around the defect area. Tape shall have a minimum of a 55% overlap on itself.

PVC Overwrap

Apply Denso® MP/HD PVC self-adhesive over-wrap tape around the full pipe circumference to completely cover the repaired patch.

6.2.2 Welded Joints, Bends and Pipes

Prepare surface in accordance with Table 3.

Primer Application

Stir primer prior to application. Apply a thin even coat of primer onto the steel surface and around the periphery of the Sintakote®. Allow the primer to tack dry (approximately 10-20 minutes).

Mastic Filling

Fillet welds, sharp edges of Sintakote®, test plugs or welding lead holes shall be filled and profiled with Bitumen Mastic Strip. The mastic filling shall be moulded such that the Densopol® 60 tape can be applied with no sharp edges.

Tape Wrapping

Commencing at least 100 mm back onto the primed Sintakote® one complete turn of 150 mm wide Densopol® 60 tape shall be applied. Release film must be removed before application. While holding the tape under tension, the pipe shall be spirally wrapped using a 55% overlap and finished 100 mm onto the primed Sintakote® with one complete circumferential wrap around the pipe. The tape shall be cut off in the downward direction of wrapping. New rolls of tape shall have the ends overlapped at least 75 mm. During wrapping the tape shall be smoothed out by hand to exclude any air bubbles or wrinkles and to seal the overlaps. Care shall be taken to prevent any folds or misplacement of the tape, especially under the pipe, and to prevent the tape becoming contaminated during wrapping.

The butt-welds in segmental (lobster back) bends are to have the tape applied partial layer by partial layer with a 55% overlap until a full spiral wrap can be made. (Refer Sketch in Appendix A) Continue wrapping onto the primed Sintakote® for at least 100 mm with one complete circumferential wrap around the pipe.

Over Wrapping

Denso® MP/HD tape (self adhesive PVC) of width 150 mm or 100 mm shall be spirally wrapped over the Bitumen Mastic Strip with a 55% overlap. While wrapping the Denso® MP/HD tape shall be pulled firmly and the edges properly sealed.

6.2.3 Steel fittings and Flanges

Procedures for the protection of steel fittings applies to both main pipeline fittings and branch pipework. Fittings manufactured and coated by Steel Mains® shall be factory coated with Sintakote®. Difficult fittings such as valves may be protected using a more conformable petrolatum system in accordance with TS 29 only with the approval of SA Water's Representative.

Steel surfaces shall be prepared in accordance with Table 3. The primer shall be applied in accordance with clause 6.2.1. The steel shall be wrapped in accordance with section 6.2.1.

Mastic Application

Unavoidable sharp edges such as bolts, nuts and collars shall have mastic strip moulded over the protrusions or edges. Wrap the fitting or flange with a layer of Bitumen Mastic Strip with a 55% overlap onto itself and a minimum 50 mm overlap onto the Densopol® 60 or Sintakote® coated pipework. Press the Bitumen Mastic Strip firmly into place ensuring no air voids are beneath the Bitumen Mastic Strip.

Note: The Bitumen Mastic Strip provides corrosion protection to the steelwork and is similar in composition to Densopol® 60 but it does not have a woven carrier.

6.3 Application of Denso® and Petro Coating Systems

6.3.1 Straight Pipe Repairs

Primer

Approved Primer shall be applied by gloved hand or brush in a thin even film over the entire prepared surface. For straight pipework application shall commence underneath the pipe. If

applicable primer shall also be applied to bolts, nuts and threads. The primer shall be rubbed well into the metal to displace any surface moisture. If the pipe is coal tar enamel coated the primer shall extend 100 mm onto the sound coating.

Mastic

Mastic shall be filled and profiled in any rough, sharp, angular or recessed areas (including the edge of coal tar enamel coating) . At completion of the profiling the surface shall be such that the tape can be applied without bridging and shall not allow the Tape to be perforated by an angular projection. Mastic shall be applied to all sharp angles, depressions, bolts, nuts and all other fitting to improve the contour for subsequent tape wrapping.

Tape Wrapping

One complete turn of 150 mm wide Tape shall be applied with the heavy compound side towards the pipe. The pipe shall then be spirally wrapped using a 55% overlap and finished with one complete turn around the pipe. Maintain a firm tension while wrapping to minimise wrinkling. The tape shall be cut off in the downward direction of wrapping. During wrapping the tape shall be smoothed out by gloved hand to exclude any air bubbles or wrinkles, and also to seal overlaps.

If it is to be applied on coal tar enamel coated pipe the Tape shall commence 100 mm back onto the primed coal tar enamel and finish 100 mm onto the primed coal tar enamel.

Care shall be taken to prevent any folds or misplacement of the tape, especially under the pipe and to prevent the tape becoming contaminated during wrapping. Care shall also be taken to avoid over stretching the tape.

Over Wrapping

150 mm wide PVC Overwrap Tape shall be spirally wrapped over the Tape using a 55% overlap while wrapping the tape shall be pulled firmly and the edges properly sealed. Narrower Overwrap Tape can be used if necessary. While wrapping, the Tape shall be pulled firmly and overlaps properly sealed.

6.3.2 Fittings and Flanges

Primer

Primer shall be applied in accordance with clause 6.2.1.

Mastic

Mastic shall be applied over the heads of the bolts and on the flange face. The mastic shall be moulded to achieve a minimum coverage of 5 mm over bolts, providing a suitable contour for tape wrapping which will prevent formation of air gaps beneath the tape. A similar application shall be performed over the nuts and protruding threads on the other side of the flange.

Tape Wrapping – Fittings

Fittings shall be wrapped with 150 mm wide Tape using a 55% overlap where possible. Narrower tape may have to be used with tight radius bends and short branches. Maintain a firm tension while wrapping to minimise wrinkling. During wrapping the tape shall be smoothed out by gloved hand to exclude any air bubbles or wrinkles and to seal any overlaps.

Tape Wrapping –Flanges

Two complete turns of 150 mm wide Tape shall be wrapped circumferentially around the flange so that the tape just covers the flange edge. The end lap shall be 75 mm and finished in a downward direction. The tape shall then be moulded over the flange (and mastic filler) and down onto the pipe

surface. Tape shall then be applied in a similar manner on the opposite side providing a double thickness of tape over the whole flange. Continuous tape wrapping over a flange is also acceptable provided at least two complete layers of tape cover all surfaces.

Over Wrapping

Fittings and flanges shall be wrapped with 150 mm wide PVC Overwrap Tape to completely encapsulate the previously applied Tape. Narrower Overwrap Tape may be used if necessary. While wrapping, the Overwrap Tape shall be pulled firmly and the laps properly sealed.

7 Inspection

7.1 General

The work shall be monitored and inspected by an accredited coating inspector from either: the Australasian Corrosion Association (ACA) or the National Association of Corrosion Engineering (NACE). The inspector will be engaged by SA Water. To allow for inspection, at least 2 working days notice shall be given to SA Water's Representative prior to commencement of any surface preparation or coating of materials.

Inspectors shall not be available outside of normal accepted industry working hours, unless specifically agreed to by SA Water

7.2 Testing

All repairs and wrapping shall be tested using a high voltage "spark" tester in accordance with AS 3894.1 at an operating voltage of 15 kV.

7.3 Re-inspection

Should SA Water's Representative find the surface preparation or applied coating to be unsatisfactory and require rework, the additional costs (including additional inspection costs) may be charged to the Contractor. These costs may be deducted from any moneys due and payable to the Contractor.

8 Additional Information

Additional specific information relating to the wrapping of valves, gibault joints etc. and the quantities required are available from Denso (Australia) Pty Ltd® or Petro Coating Systems Pty Ltd®.