

Engineering Services

**Technical Standard
TS 15**

**Protection of Steelwork in
Immersed Conditions**

**Revision: 1.0
Date: 13 November 2015**

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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 84, TS 97 and TS 99 and supersedes these documents.

The following technical changes have been made:

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



Document Controls

Revision History

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Approvers

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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 steelwork in immersed environments.

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 to ensure that assets covered by the scope of this standard 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
APAS	Australian Paint Approvals Scheme
DFT	Dry film thickness
NACE	National Association of Corrosion Engineers
PCCP	Painting Contractor Certification Program
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 4	Abrasive Blast Cleaning
AS 3894	Site testing of protective coatings
Part 1	Non-conductive coatings - Continuity testing - High voltage ('brush') method
Part 3	Determination of dry film thickness
Part 5	Determination of surface profile
Part 6	Determination of residual contaminants
Part 10	Inspection Report – Daily surface and ambient conditions
Part 11	Equipment Report
Part 12	Inspection report – Coating
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
APAS D – 184	Guidelines to Specification, Supply and Quality Assurance (www.apas.gov.au)

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 16	Protection of Steelwork in Atmospheric Environments
TS 18	Protection of Steel Pipework in Buried Conditions

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): <ul style="list-style-type: none"><li data-bbox="635 421 1362 450">• Superintendent's Representative (e.g. AS 4300 & AS 2124 etc.)<li data-bbox="635 454 970 483">• SA Water Project Manager<li data-bbox="635 488 1075 517">• SA Water nominated contact person
Responsible Discipline Lead	The engineering discipline expert responsible for TS 15 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 steel pipes and structures in submerged conditions using the following protection systems:

1. Ameron Amercoat CC703/2.
2. Jontun Jotamastic 87.
3. Jotun Marathon.
4. Watty Epinamel DTM 985.
5. Jotun Tankguard 412.
6. International Interline 975.
7. International Interzone 954.

3 Product Selection

Unless the coating material is explicitly specified in the project specification, Table 1 shall be used to determine the required coating. All materials listed in this document are suitable for use in submerged conditions for both repair and application on new steelwork. Galvanised steel shall not be used for steelwork in immersed conditions. For steelwork in atmospheric and buried conditions refer to TS 16 and TS 18 respectively.

Table 1: Selection of Protective Material Coatings

	Ameron Amercoat CC703/2	Jotun Jotamastic 87	Jotun Marathon	Wattyl Epinamel DTM 985	Jotun Tankguard 412	International Interline 975	International Interzone 954
Can be applied to bare steel	✓	✓	✓	✓	✓	✓	✓
Requires abrasive blast cleaning	✓	✓	✓	✓	✓	✓	✓
Can be used with primer	No	No	No	No	Jotun Jotaprime 505	International Interline 982	No
Suitable for use in Drinking Water	x	x	✓	x	✓	✓	x
Suitable for use in Sewage	✓	x	✓	✓	x	x	x
Suitable for use in Seawater	✓	x	x	✓	x	x	✓
Suitable for use in Soil	✓ ¹	x	x	x	x	x	x
Suitable for use in Splash Zone	✓	✓	x	✓	x	x	x
Suitable for use in Non-potable water	✓	✓	✓	✓	✓	✓	✓

¹ For buried pipework refer to TS 18.

4 Coating Contractor & Quality Assurance

The Contractor shall be certified under the PCCP for the appropriate class of work or an equivalent certification, as approved by SA Water's Material Science Unit. The Contractor shall submit to SA Water's Representative documentation in accordance with their Quality Assurance Plan. However, the minimum requirement for Quality Assurance shall be completion of AS 3894.10, AS 3894.11 and AS 3894.12. All quality control records shall be available for inspection by SA Water's Representative.

5 Instructions on Supply of Materials

When available the Australian Paint Approvals Scheme (APAS) 'APAS Record of Supply' shall be requested and obtained when the product is purchased.

A 'Certificate of Test' can then be obtained by SA Water's Representative if problems in the application of the coating subsequently occur. Information and procedures concerning Records of Supply and Certificate of Test are detailed in APAS Document D-184.

Returns, as required by APAS Document D-184, shall be completed by the manufacturer and submitted to SA Water's Representative by the Contractor for forwarding to Engineering Services, Materials Science.

6 Surface Preparation

The following clause details the required surface preparation for the different coating materials. Table 2 shall be followed.

Table 2: Surface Preparation for Coating Systems

	Ameron Amercoat CC703/2	Jotun Jotamastic 87	Jotun Marathon	Wattyl Epinamel DTM 985	Jotun Tankguard 412	International Interline 975	International Interzone 954
Welding Treatments	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 2 millimetres and all weld spatter and irregularities are removed.						
Surface Contaminant 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 in accordance with AS 1627.1						
Surface Preparation	Dry blasted	Dry blasted	Dry blasted	Dry blasted	Dry blasted	Dry blasted	Wet or dry blasted
Steel finish after surface prep²	Sa 3	Sa 2	Sa 3	Sa 3	Sa 3	Sa 3	Sa 3
Surface roughness grade³	Coarse: 70-100µm	Medium: 45-70µm	Medium: 45-70µm	Medium: 45-70µm	Medium: 45-70µm	Medium: 45-70µm	Medium: 45-70µm
Timing Requirement	Coating must be completed on the same day as surface preparation.						

² For repair work, surfaces shall be cleaned to Sa 2 ½ finish.

³ The surface grade profile shall be determined in accordance with Table one of AS 3894.5.

6.1 Abrasive Blast Cleaning – Bare Steel

All surfaces to be coated shall be dry abrasive blast cleaned⁴ to the class specified in Table 2 in accordance with AS 1627.4. Abrasive materials shall be in accordance with AS 1627.4. Additionally, abrasive materials shall:

1. Be free from contamination, and
2. Contain less than 100 milligrams per kilogram of sodium chloride and contain less than 30 milligrams per kilogram of copper.

7 Application of Coating System

This clause details the application of the coating material. The first coat shall be applied as soon as the surface preparation has been approved by SA Water's Representative.

7.1 Prior to Coating

Before beginning coating checking shall be undertaken to ensure that:

1. Surface temperature of steel is a minimum of 3 °C above dew point.
2. Use of dehumidification or other equipment which alter the atmospheric conditions, particularly in enclosed tanks may be acceptable to SA Water's Representative.
3. The temperature of all steel surfaces shall be between 10 °C and 45 °C during the cure period. (The product curing profile shall be obtained from the supplier prior to coating application.).
4. Application of coating shall not commence until the surface preparation has been inspected and approved by SA Water's Representative.
5. If rust-producing salts, chlorides or any other surface contamination are detected, surfaces shall be further prepared. Surfaces shall be reinspected by the SA Water Representative. This process shall be repeated, if necessary, to the satisfaction of SA Water's Representative.
6. SA Water's Representative may conduct testing for contamination material at their discretion. This testing shall be done in accordance with AS 3894.6. The maximum permissible level of chlorides shall be 21 milligrams per square metre (3.5 micrograms per square centimetre). The test areas shall be re-prepared as outlined in clause 6.
7. Commencement of work on the coating shall indicate unconditional acceptance of the surface to be coated.

7.2 Storage and Preparation of Coating Material

Coating materials shall be mixed and applied in accordance with manufacturer's written instructions. Proportioning and mixing of part cans is not permitted without the approval of SA Water's Representative. Strict attention shall be paid to the shelf life and onsite storage conditions, which shall meet the manufacturer's recommendations.

Safety and application shall be strictly in accordance with the manufacturer's written instructions.

The colour of coating used shall be as specified or as directed by SA Water's Representative.

⁴ International Interzone 954 can be either wet or dry abrasive blasted.

7.3 Coating Application

Table 3 shall be followed for steelwork coating. Minimum over coating times, as detailed in the manufacturer's data sheet, shall be observed. The top coat finish shall be generally smooth and free from protuberances and dry spray. If the coating has been allowed to cure beyond the recommended limits the area shall be whip blasted with fine silica free grit before the application of subsequent coats.

7.4 Dry Film Thickness

The dry film thickness shall be measured in accordance with AS 3894.3. Calibration of instruments shall take account of surface profile height and shall be adjusted in accordance with this test method.

7.5 High Voltage Testing

High voltage continuity testing shall be conducted on all pipe coatings and shall be in accordance with AS 3894.1.

Table 3: Specifications of Coating Materials

	Ameron Amercoat CC703/2	Jotun Jotamastic 87	Jotun Marathon	Wattyl Epinamel DTM 985	Jotun Tankguard 412	International Interline 975	International Interzone 954
Additional	A stripe coat shall be applied by brush to all welds and edges.						
Can be used with primer	No	No	No	No	Jotun Jotaprime 505 ⁵	International Interline 982 ⁴	No
Primer application⁶	N/A	N/A	N/A	N/A	Airless spray	Airless spray	N/A
Primer minimum DFT	N/A	N/A	N/A	N/A	≥50µm	15-40µm	N/A
Subsequent coat application⁷	High pressure airless spray	Airless Spray	Airless spray	Airless spray	Airless spray	Airless spray	Airless or conventional spray ⁸⁹
Accepted Thinners	Ameron Thinner 667	Jotun Thinner No. 17	Jotun Thinner No. 17	Wattyl Thinner L760	Jotun Thinner No. 4	None	International GTA 220 or GTA 415
Maximum thinning	3%	See manufacturer’s technical datasheet	15%	5%	5%	-	10%
Number of coats: all coats must be equal in thickness	Single coat with several wet-on-wet passes	One or more	Two	One or Two	Two	Two	One or more
Minimum DFT (shall not include primer)	In Potable water: ≥1 mm In Sewage: ≥1.2 mm	250-300 µm	≥500 µm	≥500 µm	≥500 µm	≥500 µm	≥500 µm

⁵ Primer shall only be used on large projects where use of a holding primer is advantageous. Using a different manufacturer’s primer under another manufacturer’s top coat is strictly forbidden.

⁶ Under special circumstances SA Water’s Representative may approve brush application for small areas.

⁷ Under special circumstances SA Water’s Representative may approve application by conventional spray, brush or roller for small structures or where air spray is not suitable.

⁸ Prior to application contractors shall ensure no amine bloom is present on steelwork.

⁹ International Interzone 954 shall remain between 13 °C and 32 °C during application.

8 Inspection

8.1 General

The work shall be monitored and inspected by an accredited coating inspector from either:

1. The Australasian Corrosion Association (ACA), or
2. The National Association of Corrosion Engineering (NACE).

The inspector will be engaged by SA Water. The contractor shall give SA Water's Representative a minimum of two working days' notice prior to commencement of any surface preparation or coating of materials to allow SA Water to arrange such inspection.

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

8.2 Re-inspection

Should SA Water's Representative find the surface preparation or applied coating to be unsatisfactory and rework is required by the contractor, 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.