SA Water

SOUTH AUSTRALIAN WATER CORPORATION

TS 24

TECHNICAL STANDARD

SURFACE PREPARATION AND PROTECTION OF STEELWORK USING ZINC / EPOXY HIGH BUILD, 2-PACK MICACEOUS IRON OXIDE / GLOSS, 2-PACK TOPCOAT

Issued by: Manager Engineering

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Government of South Australia

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APPROVAL TO DEVIATE FROM THIS STANDARD

Approval may be granted by the Asset Owner to deviate from the requirements as stipulated in this Standard if the functional requirements (e.g. Asset Life) for the asset differs from those stated in the Standard, but is assessed as still being acceptable by the Asset Owner's nominated representative.

Any approval to deviate from the stated requirements of this Standard will not be seen as creating a precedent for future like project. Any request to deviate from this Standard must be carried out on a project by project basis where each alternate proposal will be individually assessed on its own merit.

NO CHANGES REQUIRED IN THE JANUARY 2007 EDITION

The following lists the major changes to the August 2004 edition and published in the September 2004 edition of TS 24:

1. Reformatted from DS to TS (Departmental Standard to Technical Standard), and updated referenced Australian Standards.
2. Conversion to a technical standard by removal of contractual conditions (to be included in the contract that references this standard).

CONTENTS

REFERENCED DOCUMENTS

AS 1627: Metal finishing - Preparation and pretreatment of surfaces

AS 3894: Site testing of protective coatings

AS/NZS 4680: Hot-dip galvanized (zinc) coatings on fabricated ferrous articles

APAS Document D - 184: Guidelines to Specification, Supply and Quality Assurance (www.apas.gov.au)

APAS 2908

APAS 2911

APAS 2916

APAS 2919

APAS 2973

SECTION 1: SCOPE

This Technical Standard (TS) details the surface preparation, application and repair of inorganic zinc silicate or epoxy 2-pack zinc rich or hot dip galvanising / epoxy high build 2-pack-micaceous iron oxide / high gloss, 2-pack topcoat protective coating system used for the protection of steelwork in aggressive atmospheric environments, such as sewage treatment works and severe marine environments.

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

SECTION 2: COATING CONTRACTOR & QUALITY ASSURANCE

The Contractor shall be certified under the 'Painting Contractor Certification Program' for the appropriate class of work or an approved equivalent. 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, 'Site testing of protective coatings' equipment and inspection reports.

2.1 SA Water's Representative

SA Water's Representative in this Technical Standard will be nominated by SA Water.

SECTION 3: INSTRUCTIONS ON SUPPLY OF MANUALS

Australian Paint Approvals Scheme (APAS) 'APAS Record of Supply' shall be obtained when the product is purchased. The purchaser shall request an 'APAS Record of Supply' from the manufacturer at the time paint is ordered. A 'Manufacturer's Certificate of Test' can then be obtained 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 'Guidelines to Specification, Supply and Quality Assurance' (www.apas.gov.au).

Returns as required by APAS Document D-184 instructions shall be completed by the manufacturer and submitted to SA Water's Representative by the Contractor for forwarding to the Material Sciences Unit.

SECTION 4: SAFETY AND ENVIRONMENT

The Contractor shall conduct the operations (including blast cleaning and coating application) in accordance with the standards of safety laid down in *the South Australian Occupational Health, Safety & Welfare Act* and all regulations thereunder.

All operations shall be conducted in accordance with the *Environmental Protection Act*.

All operations conducted outside the state of South Australia shall meet all local safety and environmental requirements. Contractors are responsible for obtaining all necessary approvals and disposal of all waste.

SECTION 5: SURFACE PREPARATION

5.1 Steel Surfaces (not galvanised)

5.1.1 General

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 mm and all weld spatter and irregularities are removed.

Before commencing coating application the coating Contractor shall inspect the surfaces to be coated. If the Contractor considers there are any imperfections that may render the coating unsatisfactory, the Contractor shall notify SA Water's Representative. Commencement of work on the coating shall indicate unconditional acceptance of the surface to be coated.

All 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.

5.1.2 Removal of Oil and Grease

Oil and grease shall be removed from all steelwork using an alkali degreasing process or solvent washing as approved by SA Water's Representative and in accordance with AS 1627.1 "Part 1: Cleaning using liquid solvent and alkaline solutions".

5.1.3 Abrasive Blast Cleaning

All surfaces to be coated shall be wet or dry abrasive blast cleaned to class Sa 3 finish in accordance with AS 1627.4 "Part 4: Abrasive blast cleaning". The surface profile shall be a medium profile grade with profile height between 45 and 70 microns in accordance with Table A of AS 3894.5 "Method 5: Determination of surface profiles" and shall be determined in accordance with this standard. Abrasive materials used shall be in accordance with AS 1627 Part 4, be free from

contamination, contain less than 100 milligrams per kilogram sodium chloride and contain less than 30 grams per kilogram of copper.

Water used during the cleaning process shall be potable and shall not contain more than 500 milligrams per litre of total dissolved salts. All surfaces may be initially wet blasted or ultra high pressure water blasted followed with final dry blasting after all moisture has dissipated. If wet abrasive blast cleaning is used, soluble polyphosphate corrosion inhibitor approved by the coating manufacturer shall be properly added to the water in the minimum concentration specified on the manufacturer's written instructions to prevent rusting. Toxic inhibitors such as chromate, nitrate and nitrite shall not be used.

All work shall be coated on the same day as it is cleaned and while the surface remains class Sa 3 finish. Coatings shall not be applied if the steel temperature is less than 3°C above dew point. Use of dehumidification or other equipment to alter the atmospheric conditions, particularly in enclosed tanks, may be acceptable to SA Water's Representative.

The Contractor shall not apply the coating until the surface preparation has been inspected and approved by SA Water's Representative. If rust-producing salts, chlorides or any other surface contamination judged by SA Water's Representative to be detrimental to coating performance is detected, surfaces shall be further prepared to remove all such contamination to the satisfaction of SA Water's Representative. Testing for such contamination shall be conducted in accordance with AS 3894.6 "Method 6: Determination of residual contaminants". The maximum permissible level of chlorides shall be 50 milligrams per square metre. This equates to 8.3 micrograms per square centimetre of sodium chloride. (Refer to Clause 7.2)

5.2 Hot Dip Galvanised Steel Surfaces

5.2.1 General

Steelwork shall be hot dip galvanised in accordance with AS/NZS 4680. The coating contractor shall inspect the surface to be coated and if he/she considers there are any imperfections, which may render the coating unsatisfactory, the contractor shall notify SA Water Representative before starting the coating work. Commencement of the coating work shall indicate unconditional acceptance of the surface to be coated.

All surfaces shall be free from oil, grease, soil, moisture and any other material likely to impair the adhesion of the coating. Excessive localised lumps or pools of zinc and all dross shall be removed.

5.2.2 Removal of Oil and Grease

Oil and grease shall be removed from all steelwork using an alkali degreasing process or solvent washing as approved by SA Water Representative and in accordance with AS 1627.1 "Part 1: Cleaning using liquid solvent and alkaline solutions".

5.2.3 Abrasive Blast Cleaning

This procedure is intended to remove oxide film and surface contamination and lightly profile the surface with minimal reduction in galvanised coating thickness. (no more than 10 microns) The surfaces shall be lightly 'whip' or 'brush' blasted to provide a fine surface profile. Surfaces shall be dry abrasive blast cleaned generally in accordance with AS 1627.4 "Part 4: Abrasive blast cleaning".

The cleaning procedure shall be in accordance with the following requirements and Appendix I of AS/NZS4680 'Hot dip galvanised (zinc) coatings on fabricated ferrous articles'. Abrasive shall be garnet or other approved silica free mineral. Abrasive materials used shall be in accordance with AS 1627.4, be free from contamination, contain less than 100 milligrams per kilogram sodium chloride and contain no metallic copper.

All work shall be coated on the same day as it is prepared and before any visible oxidation occurs. Coatings shall not be applied if the steel temperature is less than 3°C above dew point.

The Contractor shall not apply the coating until the surface preparation has been inspected and approved by SA Water's Representative. If salts, chlorides or any other surface contamination judged to be detrimental to coating performance are detected, surfaces shall be further prepared to remove all such contamination to the satisfaction of SA Water's Representative.

SECTION 6: APPLICATION OF COATING SYSTEM

6.1 General

All products shall be approved by the Australian Paint Approvals Scheme (APAS). All products in the system shall be from the same manufacturer. Coating materials shall be mixed and applied in accordance with the manufacturer's written instructions. Proportioning and mixing of part cans is not permitted without the approval of SA Water Representative. Strict attention shall be paid to the shelf life and onsite storage conditions, which shall meet the manufacturer's recommendations.

The finish shall be generally smooth and free from protuberances.

The surface temperature of the steel to be painted shall be at least 3°C above dew point. Coating shall not be applied to any surface, which will have a temperature less than 10°C or more then 55°C during the cure period.

The first coat shall be applied as soon as the surface preparation has been approved by SA Water's Representative. Application of subsequent coats shall not exceed the recoat times indicated on the manufacturer's technical data sheet. 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.

6.2 Primer Coat (for bare steel)

The primer coat shall be a two part (liquid and zinc dust) inorganic zinc silicate coating for the protection of steel to APAS 2908 or APAS 2973 or epoxy, 2-pack zinc rich approved in accordance with APAS 2916. It shall be applied with a minimum dry film thickness of 75 microns and a maximum of 100 microns. Application shall be by conventional spray equipment as recommended in the manufacturer's data sheet and shall be continuously mechanically stirred while spraying. Minimum overcoating times as detailed in the manufacturer's data sheet shall be observed.

Note this coat will be omitted on galvanised steel.

6.3 Intermediate Coat

The intermediate coat shall be epoxy high build, 2-pack-micaceous iron oxide approved to APAS 2973. The minimum dry film build thickness shall be 200 microns. Spray application shall be used. The coating may be applied in two coats over the inorganic zinc silicate primer, as a thinned mist coat followed by a build coat. Brush application for small areas may only be used if approval has been given by SA Water's Representative.

6.4 Top Coat

Gloss polyurethane, 2-pack solvent borne or gloss catalysed acrylic, 2-pack solvent borne approved to APAS 2911 or APAS 2919. The coating shall be applied by spray to give a minimum dry film thickness of 50 microns. The colour shall be as specified or directed by SA Water's Representative.

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

6.5 Dry Film Thickness

The dry film thickness shall be measured in accordance with AS 3894.3 "Method 3: Determination of dry film thickness" or as approved by SA Water's Representative. Calibration of instruments shall take account of surface profile height and shall be adjusted in accordance with this test method.

SECTION 7: INSPECTION

7.1 General

The work shall be monitored and inspected by an Australasian Corrosion Association Accredited Coating Inspector who will be engaged by the SA Water. SA Water's Representative for surface preparation and coating would usually be the Coating Inspector. To allow for inspection, 48 hours notice shall be given to SA Water's Representative prior to commencement of any cleaning or application of coating. Subsequently SA Water's Representative shall be kept informed with at least 48 hours notice of future work schedules for cleaning and painting.

Inspectors will not be available outside of normal accepted industry working hours, unless specifically agreed to by the inspector.

7.2 Before Coating

The Contractor shall not apply any coating until the surface preparation has been inspected and approved by SA Water's Representative. SA Water's Representative may, at his/her discretion, perform any tests relating to surface preparation or contamination. If testing is required, the test areas shall be prepared again in accordance with Clause 5.1.3 or 5.2.3 after the testing is complete.

7.3 After Completion of each Coating

The coating will be inspected by SA Water's Representative as soon as practicable after completion of each coating to ensure compliance with the standard.

Areas that have been inadequately or unsatisfactorily coated shall be treated in accordance with Section 6 or Section 8 as directed by, and to the satisfaction of SA Water's Representative.

7.4 Re-inspection

Should surface preparation or applied coating prove to be unsatisfactory in the view of SA Water's Representative and require rework and subsequent inspection, the cost of such inspection will be charged to the Contractor and such costs will be deducted from any moneys due and payable.

SECTION 8: REINSTATEMENT OF CURED COATING

Damaged and defective areas shall be abraded by dry abrasive blast cleaning, power disk sanding till bright steel is exposed, as approved by SA Water's Representative and coated with inorganic zinc silicate or epoxy, 2-pack zinc rich in accordance with Clause 6.2.

Epoxy high build 2-pack MIO coating shall be abraded by abrasive blasting, power tool sanding or hand sanding and the edges feathered back by the same means for approximately 20 millimetres. Coating shall be re-applied in accordance with Clause 6.3, however no coating shall extend beyond the edge of the prepared area.

The topcoat shall be applied in accordance with Clause 6.4. Prior to application over cured coating it shall be lightly abraded. Small areas of coating may be applied by brush with the approval of SA Water's Representative.