1.0 SCOPE

This document summarises the procedure for the application of 2 pack High Build Ceramic Filled Epoxy coating applied to the internal surfaces of control valves.

Refer Design Standard, DS 95 (Standard for the Selection, Preparation, Application, Inspection and Testing of Protective Coatings on Water Corporation Assets) for additional information or clarification.

It shall be read in conjunction with Water Corporation surface preparation specification A1 - Surface Preparation for the application of Protective Coatings on Steel or Cast Iron.

2.0 PURPOSE

This coating system is applied on the internal surfaces of Cast Iron Control Valves (Pressure Relief Valves, Radial Valves etc.) used for potable and wastewater structures. For potable water applications the coating shall also have AS 4020 (Testing of products for use in contact with drinking water) approval.

3.0 DEFINITIONS


Contractor: The service provider or its sub-contractor who will undertake the works.

Corporation: The Water Corporation and the Principal for the purposes of externally contracted asset delivery.

DFT: Dry Film Thickness.

ITP: The detailed Inspection and Test Plan(s) for the Works.

NACE: National Association of Corrosion Engineers.

Spark Testing: Testing of the continuity of a fully-cured coating film for evidence of defects, pin holes, holidays (misses) or damage.

Superintendent: The Superintendent for the contract, as defined in the conditions of contract, who is appointed by the Water Corporation to manage/oversee the work under the contract on behalf of the Water Corporation.

TDFT: Total Dry Film Thickness.
COATING SPECIFICATION

HIGH BUILD CERAMIC FILLED EPOXY, POLYURETHANE TOP COAT FOR REPAIR OF CONTROL VALVES

COATING SPECIFICATION: F2  ISSUE: 3  DATE: JULY 2019

Works: The surface preparation, coating application and inspection to be undertaken by the contractor to which this coating specification applies.

<table>
<thead>
<tr>
<th>4.0 SURFACE PREPARATION</th>
</tr>
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<tbody>
<tr>
<td>4.1 All visible mill scale, rust, oxides, paint and other foreign matter shall be removed from the surfaces to be coated by blast cleaning to a <strong>Class 3</strong> (white metal) finish as specified in AS 1627 Part 4.</td>
</tr>
<tr>
<td>4.2 The blast cleaned surfaces shall have a uniform metallic appearance, a surface profile which provides satisfactory anchorage for the coating, as per paint manufacturer’s recommendation and be otherwise compatible with the coating to be applied.</td>
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<tr>
<td>4.3 Coating shall not be applied to surfaces which have become contaminated or deteriorated after blast cleaning.</td>
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<tr>
<td>4.4 Prior to blast cleaning the area to be blasted will be clearly marked and explained to the operator, all external surfaces will be masked off to prevent damage to the external coating.</td>
</tr>
</tbody>
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<thead>
<tr>
<th>5.0 COATING MATERIALS</th>
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<tbody>
<tr>
<td>5.1 Coating materials used for attaining the specified standard shall be selected in accordance with Appendix 3 of DS-95- commonly used coatings in potable water and wastewater infrastructures unless approved otherwise by the Team Leader – Asset Durability. This approval is required before coating commences.</td>
</tr>
<tr>
<td>5.2 The coating components shall be thoroughly mixed in the specified proportions. Material so prepared shall be used within the “pot-life” period claimed by the manufacturer for the relevant site conditions.</td>
</tr>
<tr>
<td>5.3 Coating specifications inclusive of datasheets, coating application, method statements and ITP’s shall be submitted to the Principal for approval at least 10 working days prior to commencement of the work.</td>
</tr>
<tr>
<td>5.4 Edges, crevices, seams, joints and corners shall be brush coated before commencement of spray application of the coating.</td>
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<tr>
<td>5.5 Mixing, thinning, application and curing of protective coatings shall be carried out in accordance with the coating manufacturer's recommended practice for the on-site conditions. Recommended drying times between coats shall not be exceeded.</td>
</tr>
</tbody>
</table>
6.0 COATING APPLICATION – TO FILL LOCALISED PITS/CAVITATION

6.1 All pitted areas shall be repaired using an approved filler eg. Belzona® 1111 in accordance with the product data sheet.

Note: After mixing, ensure that the pits are filled out quickly to prevent the product from curing prematurely, especially in hot ambient conditions.

6.2 Using a paint brush with the bristles cut short (1 inch of bristles left) scrub into the pit the mixed filler to wet it out completely.

6.3 Once wetted out apply additional material taking care to fill the pit and not just bridge over it [Refer: Figure 1].

Figure 1 - Filler scrubbed into the pit to wet the surface.

6.4 Contour the filler to the required shape leaving it smooth with no ridges or high spots that could protrude through the final coating [Refer: Figure 2].

Figure 2 - Additional filler added to fill the pit. Do not bridge it.
7.0 COATING APPLICATION – TO FILL MULTIPLE PITS/CAVITATION

7.1 For multiple pits [Refer: Figure 3], the substrate preparation is the same as Section 4.0 and coating application of the filler procedure is the same as for isolated pits, as described in Section 6.0.

Figure 3 - Filler scrubbed into pits to wet the surface.

7.2 Contour the filler to the shape of the structure leaving it smooth with no ridges or high spots that could protrude through the final coating [Refer: Figure 4].

Figure 4 - Additional filler added to fill the pits. Do not bridge them.
**COATING SPECIFICATION**

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**8.0 COATING APPLICATION**

8.1 All subsequent coats shall be applied within the 4 hour blasting window to prevent loss of the grit blasted surface during application of the main coating.

8.2 A stripe coat of the approved coating material is required to be applied to all welds, corners and edges.

8.3 Using a brush with the bristles cut short (1.5 inch) scrub the mixed coating into the blasted surface and brush out uniformly.

8.4 During application, the material shall be visually checked for pinholes and where found these should be brushed out.

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**9.0 COATING THICKNESS**

9.1 **Internal surfaces**: The internal surfaces of Control Valves are to be coated with two or more coats of coating to achieve a minimum 500 microns dry film thickness.

9.2 **External surfaces**: The external surfaces including flange backing faces shall be coated with two or more coats of an approved 2 pack Epoxy Mastic coating to achieve a minimum 500 microns dry film thickness, followed by a nominal dry film thickness of 50 microns of Polyurethane top coat.

9.3 Finished coating thickness shall be determined using suitable instruments standardised (zeroed) on a smooth uncoated metal plate in accordance with AS 3894.3.

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**10.0 COATING TERMINATION**

10.1 The details on the required coating thickness of the control valve is shown in Figures 5.

10.2 The details on the overlap should be agreed on site prior to start of valve lining works by Water Corporation representative and the Contractor.

10.3 On flange areas, the Epoxy Mastic coating, should overlap onto the internal coating by a minimum of 50 mm [Refer: Figures 6].
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Figure 5 – Required coating thickness on the Internal and External of the Control Valve.

Legend

**Internal Coating:** Spray apply epoxy mastic with a minimum DFT of 500 microns.

**External Coating:** Spray apply epoxy mastic with a minimum DFT of 500 microns followed by 50 microns top coat of polyurethane

**Flange Face Coating:** Spray apply epoxy mastic with a DFT of 250 to 375 microns, followed by 50 microns top coat of polyurethane

**Sealing Face Coating:** Spray apply epoxy mastic with a DFT of 50 to 250 microns.

**Note:** Colours in the above diagram is indicative only, standard valve coating colours to be used.
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Note: Colours in the above diagrams are indicative only, standard valve coating colours to be used.
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Figure 6 – Overlap of coatings on the flange area.

Note: Colours in the above diagrams are indicative only, standard valve coating colours to be used.

11.0 COATING FINISH

11.1 The finished coating shall be of uniform thickness, colour, appearance and gloss. It shall be fully cured, insoluble, adherent, coherent and free from holidays, laps, sags, blistering, checking, wrinkling, overspray, patchiness and any other defects that may impair the performance and/or appearance of the coating.

11.2 Protective coating colours shall comply with AS 2700 - Colour Standards for General Purposes. If a suitable approved colour is not available, then the proposed colour shall be referred to the Water Corporation for acceptance prior to use. Reference shall be made to Water Corporation Colour Code Drawing No. EG71-1-1, Rev. E for details of colours to be used for different applications.

11.2.1 Where valves are being supplied by a European manufacturer reference shall be made to DS 95 Table 11 for equivalent European standard colours (RAL), unless agreed otherwise by the Superintendent.
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12.0 SUITABLE COATING PRODUCTS

<table>
<thead>
<tr>
<th>Coating Type</th>
<th>International Paints</th>
<th>Enecon</th>
<th>Wattyl Paints</th>
<th>Jotun Paints</th>
<th>Dulux Paints</th>
<th>Chesterton Paints</th>
<th>Belzona Paints</th>
</tr>
</thead>
<tbody>
<tr>
<td>External: Epoxy Mastic</td>
<td>Interplus 1180</td>
<td></td>
<td>Epinamel DTM985</td>
<td>Jotacote 605*</td>
<td>Durebild STE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal: Ceramic Coating</td>
<td>Chemclad XC*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Chesterton ARC 885*</td>
<td>Belzona 1341*</td>
</tr>
</tbody>
</table>

Note: *Potable water approved coating. Refer: DS95 Schedule 5 – Products approved to use in Potable Water issued by Drinking Water Quality Branch, Water Corporation.

13.0 COATING APPLICATOR/PERSOENNEL QUALIFICATION

13.1 Work shall only be carried out by competent personnel.

13.2 The work shall be undertaken by an approved Water Corporation Corrosion Control Panel Services member, unless approved otherwise by the Team Leader – Asset Durability

13.3 Surfaces to be coated which will become inaccessible after assembly or erection shall be cleaned and painted before they become inaccessible.

13.4 The Applicator’s Coating Supervisor shall possess as a minimum one of the following certifications:

- ACA - Corrosion Inspector; or
- NACE - CIP Level I Coating Inspector.

13.5 The coating contractor shall nominate a Coating Inspector as their Quality Control Officer to carry out inspections, submit the ITP, undertake the required testing and maintain appropriate records for all work performed.

The Applicator’s Coating Inspector shall possess as a minimum one of the following certifications:

- ACA - Coating Inspector; or
- NACE - CIP Level I Coating Inspector.

14.0 INSPECTION AND TESTING OF COATING
**COATING SPECIFICATION**

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14.1 **Visual Testing** - Coatings shall be visually examined for surface defects and any discontinuity arising after curing shall be recorded.

14.2 **Spark Testing** - The finished, fully cured coating subjected to buried or immersed conditions shall be holiday tested in accordance with AS 3894.1.

14.3 **Adhesion Testing** - Adhesion testing shall be carried out in accordance with AS 1580 Method 408.5 and AS 3894.9 Method C. Acceptable pull off force shall be greater than or equal to 5MPa.

14.3.1 A test panel/coupon (of similar substrate material) shall be prepared and a pull off test consisting of a minimum 3 dollies, 100mm apart, shall be carried out to confirm the adhesion of the coating.

14.3.2 In the event of test failure, additional adhesion tests shall be carried out on the asset under construction.

14.3.3 The results of all adhesion tests shall be submitted to the Superintendent as part of the overall quality control documentation.

14.3.4 The results of this test shall be submitted to the Superintendent along with the ITP, other relevant product information and coating application procedures for review a minimum of 10 days prior to commencing work.

**15.0 REPAIR OF A DEFECTIVE COATING AND RETESTING**

15.1 Coatings with defective areas equal to 20% or more of the total coated surface will be rejected outright.

15.2 Defects such as pinholes, cracks, blisters, voids, foreign inclusions and irregular profile peaks shall be marked for repair and retested upon full cure of the repaired coating.

**16.0 RECORDING AND REPORTING**

16.1 Following testing a report shall be submitted by the Contractor. The Contractor shall keep detailed records and reports including the following:

- Environmental conditions (relative humidity, dew point etc.);
- Surface preparation;
- Surface profile;
- Coating application;
- Coating testing; and
- General failure.
16.2 To supplement these records, prior to any works commencing, an Inspection Test Plan (ITP) shall be forwarded to the Water Corporation for review a minimum of ten working days prior to the commencement of work.

17.0 CONTRACTOR'S RESPONSIBILITY

17.1 The Contractor shall supply all necessary plant, equipment, materials and labour, prepare the surface and apply and maintain the protective coating in accordance with this specification.

17.2 The preceding inspection clauses shall not relieve the Contractor of their responsibility to supply materials and perform work in accordance with the requirements of any overriding contract documentation.

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