

## COATING SPECIFICATION

### HIGH BUILD CERAMIC FILLED EPOXY COATING ON PUMPS

COATING SPECIFICATION: F3

ISSUE: 4

DATE: FEBRUARY 2023

#### 1.0 SCOPE

The intent of this document is to provide specification for application of 2 pack high build ceramic filled epoxy coating on pumps.

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 the Corporation surface preparation specification **A1 - Surface Preparation for the application of Protective Coatings on Steel or Cast Iron**.

#### 2.0 PURPOSE

This coating system shall be applied to the internal surfaces of cast iron pumps that are used for potable and wastewater applications. For potable water applications, the proposed coating system shall have AS 4020 (Testing of products for use in contact with drinking water) approval.

#### 3.0 DEFINITIONS

**ACA:** Australasian Corrosion Association.

**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. (Principal).

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

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#### 4.0 SURFACE PREPARATION

- 4.1 Preparation of substrate shall follow Specification A1 - Surface Preparation for the application of Protective Coatings on Steel or Cast Iron.
- 4.2 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 Class 3 (white metal) finish as specified in AS/NZS 1627 Part 4.
- 4.3 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.
- 4.4 Particulate contamination to be conducted on blasted surface for surfaces to be used in an immersed environment as per DS95 - clause 4.21. The dust quantity level shall not exceed rating 2 and class 2 for dust particle size.
- 4.5 Coating shall not be applied to any prepared surface(s) exhibiting "flash corrosion" or that has been abrasive blasted more than 4 hours prior to commencement of coating.
- 4.6 Assessment of the surface profile height or anchor pattern of the abrasive blasted surface shall be carried out using the Replica Tape method (TESTEX PRESS-OFILM) as described in AS/NZS 3894.5. Profile range between 75-100µm on carbon steel or as per manufacturers recommendations.
- 4.7 Soluble salt testing shall be conducted on the prepared blasted surface before coating application as per clause 4.1 of Water Corporation DS95 unless specified otherwise.
  - Immersion service - 3µg/cm<sup>2</sup>
  - Ambient service - 5µg/cm<sup>2</sup>

#### 5.0 COATING MATERIALS

- 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 Principal. This approval is required before coating commences.
- 5.2 The coating components shall be thoroughly mixed in the specified proportions as per manufacture recommendations.
- 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.

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- 5.4 Edges, crevices, seams, joints and corners shall be brush coated before commencement of spray application of the coating.
- 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.

#### 6.0 ATMOSPHERIC CONDITIONS

- 6.1 Prior to and during coating application, the contractor shall record details pertaining to environmental conditions including ambient and surface temperature, relative humidity and dew point.
- 6.2 Coating application shall not commence if any one of the following conditions exists:
- The relative humidity is above 85%;
  - The substrate temperature is less than dew point plus 3°C;
  - The substrate temperature is below 10°C;
  - The substrate temperature is above 55°C;
  - The surface to be coated is wet or damp;
  - Where specified cleanliness of the surface deteriorates;
  - If the weather is deteriorating or is unfavorable for application or curing.

#### 7.0 COATING APPLICATION – TO FILL LOCALISED PITS/CAVITATION

- 7.1 All pitted areas shall be repaired using an approved filler, e.g. Belzona® 1111 or similar approved equivalent, in accordance with the manufacturer's instruction as specified in the product data sheet. For potable water application, the filler shall also have AS 4020 (Testing of products for use in contact with drinking water) approval.

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

- 7.2 Using a paint brush with the bristles cut short (1 inch of bristles left) scrub the mixed filler into the pit to wet it out completely.
- 7.3 Once wetted out, apply additional material taking care to fill the pit and not just bridge over it [Refer Figure 1].

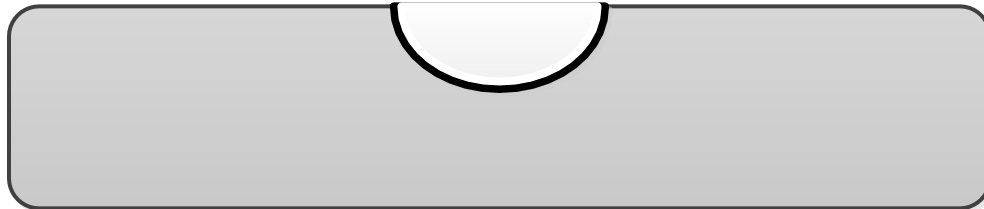
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**Figure 1 - Filler scrubbed into the pit to wet the surface.**

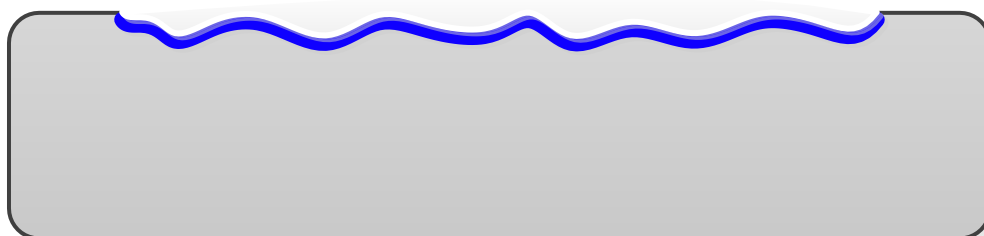
- 7.4 Contour the filler to the required shape leaving it smooth with no ridges or high spots that could protrude through the final coating [Refer Figure 2].



**Figure 2 - Additional filler added to fill the pit. Do not bridge it.**

#### 8.0 COATING APPLICATION – TO FILL MULTIPLE PITS/CAVITATION

- 8.1 For multiple pits [Refer Figure 3], the substrate preparation is the same as Section 4.0 and coating application of 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.**

- 8.2 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 4].

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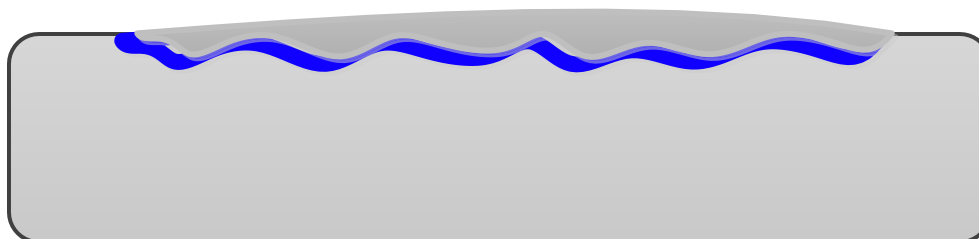


Figure 4 - Additional filler added to fill the pits. Do not bridge them.

#### 9.0 COATING APPLICATION

- 9.1 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.
- 9.2 A stripe coat of the coating material is required to be applied to all welds, corners and edges.
- 9.3 Using a brush with the bristles cut short (1.5" inch) scrub the mixed coating into the blasted surface and brush out uniformly.
- 9.4 During application, the material shall be visually checked for pinholes and where found these should be brushed out.

#### 10.0 COATING THICKNESS

- 10.1 **Internal surfaces:** The internal surfaces of the pump shall be coated with two or more coats to achieve a minimum of 500 microns dry film thickness.

#### 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.

#### 12.0 SUITABLE COATING PRODUCTS

Coating Type	Brand Name		
	Enecon	Chesterton Paints	Belzona Paints
Ceramic Coating	Chemclad SC*	Chesterton ARC 855*	Belzona 1341*
	Ceramalloy CL ( Sewage)		

**Note:** \*Potable water approved coating. Refer: Materials, products and substances in contact with drinking water, Schedule 5 – Approved Materials issued by Department of Health WA

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#### 13.0 COATING APPLICATOR/PERSONNEL QUALIFICATION

- 13.1 Work shall only be carried out by a competent person.
- 13.2 The work shall be undertaken by an approved Water Corporation Protective Coating and Concrete Repair Services Panel member.
- 13.3 The contractor shall nominate a certified coating inspector to perform inspections and maintain appropriate records for the work performed. The coating inspector engaged in testing, monitoring, and verification of surface preparation and coating application shall hold relevant inspection qualifications and current certifications (e.g. NACE or ACA) or approved by the Principal. The coating inspector shall conduct the following:
- Prepare Quality Assurance documentation to meet the specified standards given herein and the required acceptance criteria.
  - Perform inspections and maintain appropriate records for work performed.
  - Testing, monitoring, and verification of surface preparation and coating application.

#### 14.0 INSPECTION AND TESTING OF COATING

- 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 or as per of manufacture recommendation
- 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.

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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.

14.3.4 Soluble salt testing to be conducted on the prepared blasted surface before coating application as per clause 4.1 DS 95 unless specified otherwise.

- Immersion service - 3µg/cm<sup>2</sup>
- Ambient service - 5µg/cm<sup>2</sup>

#### 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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<b>Document Revision History</b>					
<b>Sect</b>	<b>Issue</b>	<b>Date</b>	<b>Revision Description</b>	<b>RVWD</b>	<b>APROV</b>
13	4	23/02/2023	Amend coating applicator/personnel qualification	AO	SS
14	4	23/02/2023	Inspection and testing of coating	AO	SS

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