

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

1.0 SCOPE

This document summarises the procedure for the application of high build epoxy coating on control valves (e.g., pressure reducing valves, radial valves, etc.).

Ductile cast iron and grey cast iron components shall be coated with either a fusion-bonded polymeric (FBE) coating as per AS4158 or a two-pack epoxy coating. *This specification only applies to the application of a two-pack epoxy coating system.*

Valves that smaller than DN 600 are generally coated using the FBE process.

Coating systems to be applied are as follows:

- Internal: 2 pack high build epoxy coating, with > 80% volume solids or 2 pack polymer/ceramic filled epoxy.
- External: 2 pack epoxy and polyurethane top coat.

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.**

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

2.0 PURPOSE

This coating specification is used on ductile cast iron and grey cast iron valves used for potable water and wastewater structures. For potable water applications the internal coating 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.

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

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

4.0 SURFACE PREPARATION

- 4.1 Preparation of substrate to be in accordance with 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. If the blast cleaned surface is pitted, then those areas shall be repaired using a suitable filler e.g. Belzona® 1111, refer to section 6. Any filler used on potable water valves shall have AS 4020 (Testing of products for use in contact with drinking water) approval.
- 4.4 Particulate contamination to be conducted on blasted surface for surfaces to be used in an immersed environment as per DS95 - clause 4.2. 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. A Profile range between 75-100µm on carbon steel should be achieved or as per manufacturers recommendations.

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

- 4.7 Soluble salt testing to be conducted on the prepared blasted surface before coating application as per clause 4.1 DS 95 unless specified otherwise, i.e., • Immersion service - $3\mu\text{g}/\text{cm}^2$, • Ambient service - $5\mu\text{g}/\text{cm}^2$

5.0 COATING MATERIALS

- 5.1 Suitable coating products to be used in this Specification are shown in Table 1 below. Any alternative coating materials other than specified in Table 1, shall be submitted to the Principal for review and approval in writing prior to commencement of work.

Table 1 – Suitable Coating Products

Coating Type	Brand Name						
	International Paints	Enecon	Hempel	Jotun Paints	Dulux Paints	Chesterton Paints	Belzona Paints
External: Epoxy Mastic	Interplus 1180		Epinamel 985	Jotamastic 90*	Durebild STE		
Internal: Ceramic Coating		Chemclad SC*				Chesterton ARC 885*	Belzona 1341*

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

- 5.2 The coating components shall be thoroughly mixed in the specified proportions as per manufacture recommendations.

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

-
- 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.
- 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 COATING APPLICATION – TO FILL LOCALISED PITS/CAVITATION

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

Note: After mixing the materials, the Contractor shall 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 the mixed filler into the pit to wet it out completely. **[Refer: Figure 1].**

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

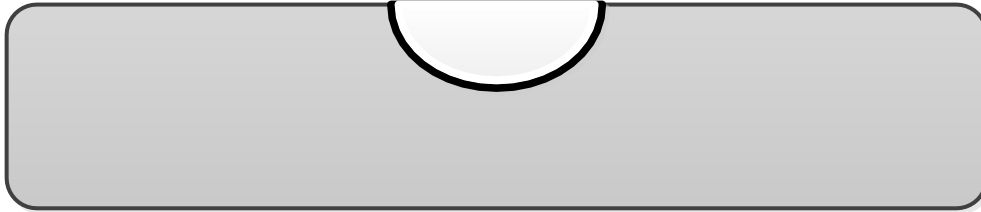


Figure 1 - Filler scrubbed into the pit to wet the surface.

- 6.3 Once wetted out, apply additional material to fully fill the pit, and not just bridge over it.
- 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 same substrate preparation as described in Section 4.0 shall be applied. The application of filler procedures shall be the same as the application for isolated pits, as described in Section 6.0.
- 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**].

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

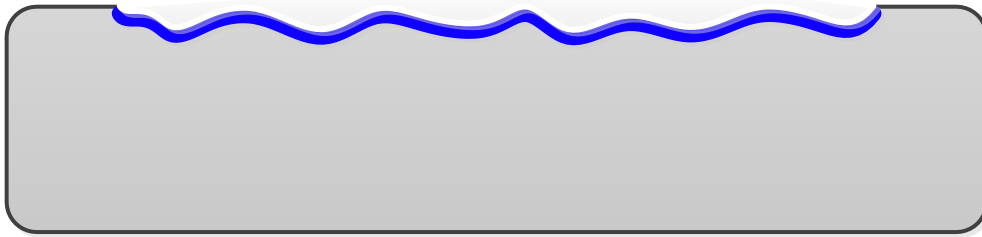


Figure 3 - Filler scrubbed into pits to wet the surface.

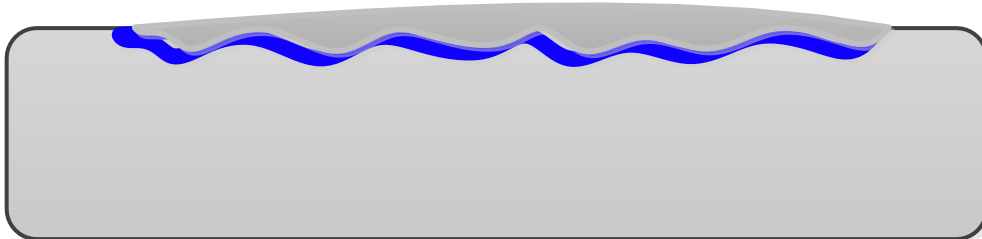


Figure 4 - Additional filler added to fill the pits. Do not bridge them.

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; any pinholes that are found shall be brushed out.

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

9.0 ATMOSPHERIC CONDITIONS

9.1 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.

9.2 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;
- The specified cleanliness of the surface deteriorates;
- If the weather is deteriorating or is unfavorable for application or curing;
- If the pot life of the paint has been exceeded.

10.0 COATING THICKNESS

10.1 **Internal surfaces:** The internal surfaces of control valves shall be coated with two or more coats of an approved epoxy coating to achieve a minimum of 500 microns dry film thickness.

10.2 **External surfaces:** The external surfaces, excluding 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.

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

- 10.3 Details on the required coating thickness of the control valve is shown in [Figures 5]. Finished coating thickness shall be determined using suitable instruments standardised (zeroed) on a smooth uncoated metal plate in accordance with AS 3894.3.
- 10.4 On flange areas, the epoxy mastic coating, should overlap onto the internal coating by a minimum of 50 mm [Refer: Figures 6].

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.

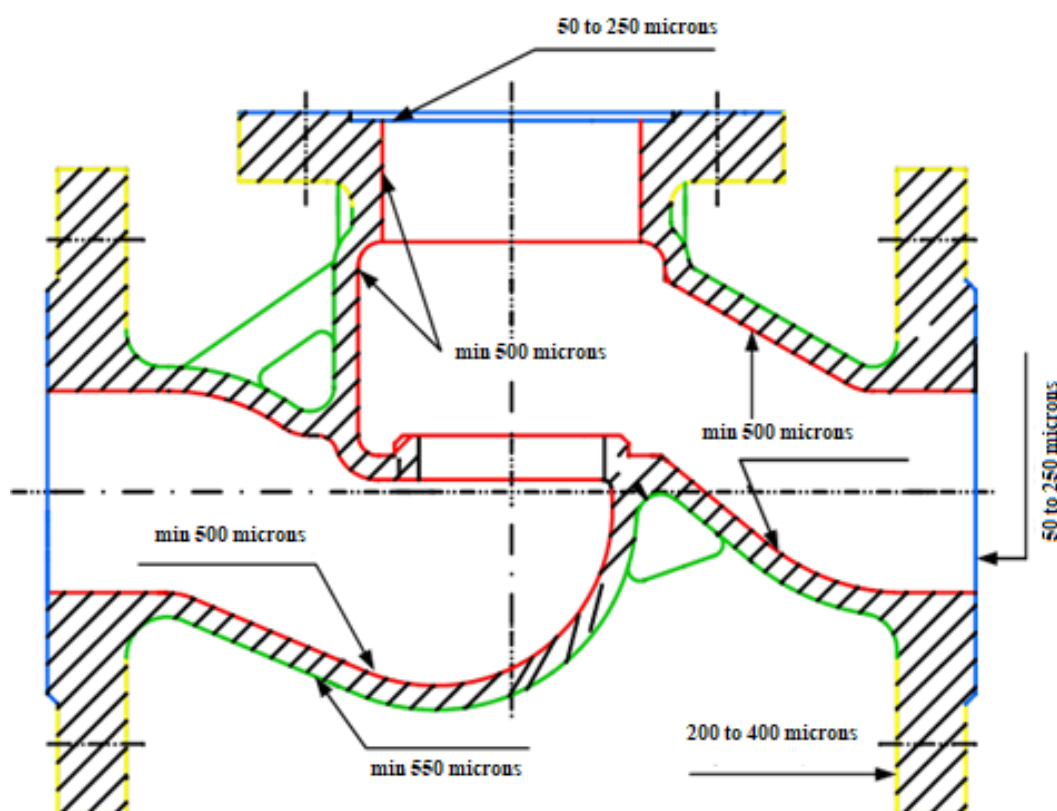


Figure 5 – Required coating thickness on the Internal and External of the Control Valve.

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

Legend

- **Internal Coating:** Spray apply epoxy or polymer/ceramic coating with a minimum DFT of 500 microns.
- **External Coating:** Spray apply epoxy with a minimum DFT of 500 microns followed by polyurethane top coat of 50 microns.
- **Flange Face Coating:** Spray apply epoxy with a DFT of 200 to 400 microns. followed by polyurethane top coat of 50 microns.
- **Sealing Face Coating:** Spray apply epoxy with a DFT of 50 to 250 microns.

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

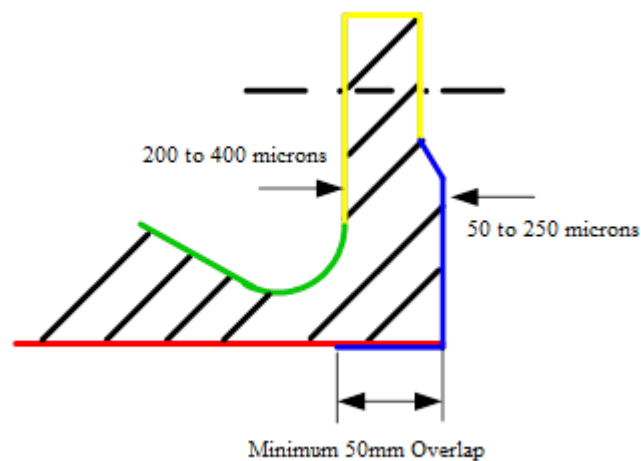


Figure 6 – Overlap of coatings on the flange area.

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

12.0 COATING APPLICATOR/PERSONNEL QUALIFICATION

- 12.1 Work shall only be carried out by competent personnel.
- 12.2 The work shall be undertaken by an approved Water Corporation Protective Coating and Concrete Repair Services panel member unless approved otherwise by the Principal.
- 12.3 Surfaces to be coated that will become inaccessible after assembly or erection shall be cleaned and painted before assembly or erection.
- 12.4 The contractor shall nominate a certified coating inspector to perform inspections and maintain appropriate records for the work performed. 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.
- 12.5 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.

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

13.0 INSPECTION AND TESTING OF COATING

- 13.1 **Visual Testing** - Coatings shall be visually examined for surface defects and any discontinuity arising after curing shall be recorded.
- 13.2 **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
- 13.3 **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.
- 13.3.1 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.
- 13.3.2 In the event of test failure, additional adhesion tests shall be carried out on the asset under construction.
- 13.3.3 The results of all adhesion tests shall be submitted to the Superintendent as part of the overall quality control documentation.
- 13.4 **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/cm² • Ambient service - 5µg/cm²
- 13.5 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.

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

14.0 REPAIR OF A DEFECTIVE COATING AND RETESTING

- 14.1 Coatings with defective areas equal to 20% or more of the total coated surface will be rejected outright.
- 14.2 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.

15.0 RECORDING AND REPORTING

- 15.1 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.
- 15.2 These records, including Inspection Test Plans (ITP) shall be forwarded to the Water Corporation on completion of works.

16.0 CONTRACTOR'S RESPONSIBILITY

- 16.1 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.
- 16.2 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.

COATING SPECIFICATION

HIGH BUILD EPOXY COATING ON CONTROL VALVES

COATING SPECIFICATION: F2

ISSUE: 4

DATE: MARCH 2023

Document Revision History					
Sect	Issue	Date	Revision Description	RVWD	APROV
1	4	24/03/2023	Amend Scope	AO	SS
2	4	24/03/2023	Amend purpose	AO	SS
4	4	17/11/2022	Amend definitions	AO	SS
4	4	25/01/2023	Full section revised	AO	SS
10	4	24/03/2023	Amend coating thickness	AO	SS
11	4	25/01/2023	Sections 11.2 & 11.2.1 removed	AO	SS
13	4	25/01/2023	Sections 13.4 & 13.5 amended	AO	SS
14	4	25/01/2023	Section 14.3.4 amended	AO	SS

--- End of Document ---