Field Joint Application Guide for Single Layer 3M™ Scotchkote™ Fusion Bonded Epoxy (FBE) Coatings and Dual Layer 3M Scotchkote Abrasion Resistant Overcoats (ARO)

Manufacture's Qualified Application Procedure (MQAP) per CSA Z245.30

The following products described in this document are qualified to meet FC1& FC3 Coating systems as described in CSA Z245.30; 3M Scotchkote Fusion-Bonded Epoxy Coating 6233P and 3M Scotchkote Abrasion Resistant Overcoat (ARO) 6352 and 6352HF. This MQAP is applicable to product manufactured after 1/1/2015.

General

This specification covers the requirements for the field application of 3M Scotchkote Fusion-Bonded Epoxy Coating 6233, 6233P, 226N, 226N+ and 3M Scotchkote Abrasion Resistant Overcoat (ARO) 6352, 6352HF to welded joints on line pipe. The work includes the furnishing of all labor, materials, tools and equipment, and the performance of all operations and incidentals necessary for coating of welded pipe joints. Coating materials shall be handled, stored, and applied in accordance with the manufacturer's specifications, or as directed by an authorized representative of the coating manufacturer.

All references to SSPC shall be interpreted as Steel Structures Painting Council. All references to NACE shall be interpreted as National Association of Corrosion Engineers. All references to CSA shall be interpreted as Canadian Standards Association.

Handling and Safety Precautions

Read all Health Hazard, Precautionary, and First Aid statements found in the Safety Data Sheet and product label prior to handling or use.

RETAIN THESE INSTRUCTION FOR FUTURE REFERENCE

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Tools and Consumables

The list of tools and consumable items is general guidance. The project specification should be used to determine exact needs for each application.

1. Heating Source – Induction coil and required infrastructure
2. Compressed Air – Source must be clean and dry
3. Required testing and inspection equipment
4. Abrasives capable of creating the required surface profile
5. Abrasive blasting equipment;
6. Powder handling and application
    a. Fluidized powder bed
    b. Powder spray equipment

Approved Solvents and Cleaning Agents

Non oily solvents; Methyl Ethyl Ketone (MEK), Xylene, Ethanol, Isopropyl Alcohol (IPA)

Other solvents may be used as agreed upon by the pipeline owner or their specific body.

1.0 Coating Thickness Range

Unless otherwise defined by the owners specification, the following thickness ranges are suggested with the approval of the specifying organization.

Single layer coating (FBE) 12-50 mils (305 µm-1270 µm); typical nominal thickness is 16 mils (406 µm).

Dual layer coating (FBE and ARO) 12-20 mils (305 µm-508 µm) of FBE and 15-40 mils (381 µm-1016 µm) of ARO; typical, nominal thickness of the system is 30 mils (762 µm).

*Note: *Coating thickness may vary depending on customer specification requirements. Thicker coatings will exhibit less flexibility. Care should be taken to validate cure.*

2.0 Surface Preparation

Unless otherwise defined by the owners specification, the following surface preparation is suggested with the approval of the specifying organization.

Prior to blast cleaning, the weld zone shall be inspected and pre-cleaned according to SSPC-SP1 to remove mud, oil, grease and loosely adhering deposits. Visible oil and grease spots shall be removed by solvent wiping. Only approved safety solvents which do not leave a residue shall be used.

The exposed metal in the weld area shall be abrasive blast-cleaned to a minimum of NACE No. 2/SSPC-SP10 IS0 8501:1, Grade SA 2 1/2 near-white finish. The adjacent fusion bonded coating shall be brush blasted to clean and roughen the coating surface for a distance of 2 in (5 cm) back from the edge of the cut-back. Near- white finish is interpreted to mean that all metal surfaces shall be grit blasted to remove all dirt, rust, corrosion products, oxides, paint and other foreign matter. Very light shadows, very slight streaks or slight discolorations shall be acceptable; however, at least 95% of the surface shall have the uniform gray appearance of a white-metal blast-cleaned surface. Height of anchor pattern profile shall not be less than 1.5 mils (38 µm) no more than 4.0 mils (101 µm). Standards for comparison shall be made available by the contractor.

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Prior to coating, the cleaned weld zone shall be inspected to ensure that all cleaning steps have been adequately performed. Blast cleaned pipe surfaces shall be protected from conditions of high humidity, rainfall, or surface moisture. The pipe surface shall not be allowed to flash rust before coating.

3.0 Application of the Fusion Bonded Epoxy (FBE)

When ambient conditions include precipitation, high winds, or low temperatures precautions should be taken to protect the coating during application and in some instances after application. Tents or portable units should be used to shield the coating from precipitation during application. In the case of high winds or low temperatures it maybe necessary to shield the pipe from rapid cooling conditions. This includes capping pipe ends and using portables to block wind. In extreme conditions a second post heat cycle may be needed to fully cure the applied coating. This should be evaluated on a case by case basis.

The weld zone shall be heated to 463˚F (239°C) while not exceeding 500˚F (260°C) using an induction heating coil of sufficient size, width and power to provide the required heat in the weld zone and 2 in (5cm) back over the FBE coating or as per line owners specification. Due to varied emissivity; optical/IR pyrometers should not be used to determine preheat on blasted surfaces.

** During the preheating process, where blistering of the existing FBE coating occurs, an incremental heating process may be used to assist with moisture removal. For further details please contact the coating manufacturer.

Immediately after heating and while the weld zone temperature is between 425˚F (218°C) and 490˚F (254°C), the weld shall be coated with Scotchkote coating at the specified thickness using powder spray equipment. Apply coating as rapidly as possible to prevent premature cool down of the heated zone. The weld joint coating shall be applied over the full width of the pipe joint and overlap the plant-applied coating no less than 2 in (5cm) or per the pipelines owners specification.

The joint coating shall cure from the residual heat remaining in the heat zone or a secondary heating cycle as conditions require. No quenching or force cooling shall be allowed, and the hot zone shall be protected from adverse weather conditions.

4.0 Application of the Abrasion Resistant Overcoat (ARO)

The Scotchkote ARO coating application occurs immediately following the application of the Scotchkote FBE coating. The ARO coating application must occur prior to the curing of the base coating. The ARO coating application is initiated while the surface temperature of the FBE is between 365ºF (185ºC) - 485˚F (251°C). This temperature can be measured using IR pyrometers with the emissivity set to 0.95. Apply the ARO coating as rapidly as possible to avoid loss of thermal energy in the heated zone. The weld joint coating shall be applied over the full width of the pipe joint and overlap the plant- applied coating no less than 2 in (5cm) or as defined in the pipeline owners specification.

The joint coating shall cure from the residual heat remaining in the heat zone or a secondary heating cycle as conditions require. No quenching or force cooling shall be allowed, and the hot zone shall be protected from adverse weather conditions.

5.0 Inspection

Unless otherwise defined by the owners specification, the following inspection is suggested with the approval of the specifying organization.

Upon completion of the coating operation, but prior to storage, the coating shall be inspected for continuity in accordance with NACE Standard SP 0188 or CSA Z245.30. The search electrode shall be steel spring or conductive rubber.

The thickness of the coating shall be checked with calibrated magnetic thickness gauge.

6.0 Compatible Coatings

Compatible coatings; All 3M Scotchkote Pipeline Coating. Other coatings maybe compatible. Please check with your 3M representative for more information.

7.0 Coating Curing

Refer to specific product technical data sheets for coating curing schedule.

*Cure conditions and heating cycles should be periodically validated using Differential Scanning Calorimetry (DSC). During periods of extreme cold or wind it may be required to post cure the coating(s) with the introduction of a second heating cycle. The need for this should be determined through evaluation of DSC testing results.

8.0 Repair Method

Unless otherwise defined by the owners specification, the following repair materials are suggested with the approval of the specifying organization.

Repair defects using suitable 3M Scotchkote two-part epoxy or 3M Scotchkote Hot Melt Patch Compound 226P patch stick.

9.0 Backfill

Coating can be backfilled once the pipe temperature reaches ambient temperature conditions.

10.0 Storage

1. Powder boxes shall be stored in a cool dry place with the bags closed and tied.

2. The powder boxes shall be stored at temperatures less than 80° Fahrenheit (27° Celsius). If powder is stored at temperatures below freezing the material shall be allowed to stabilize at a temperature above freezing prior to use.

3. Care should be taken to avoid contamination.

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