Preparing Activity: NAVFAC Superseding
UFGS-33 52 80 (February 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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SECTION TABLE OF CONTENTS

DIVISION 33 - UTILITIES

SECTION 33 52 80

LIQUID FUELS PIPELINE COATING SYSTEMS

08/22

PART 1 GENERAL

1.1 REFERENCES
1.2 SYSTEM DESCRIPTION
1.3 DEFINITIONS
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Contract Errors, Omissions, and Other Discrepancies
1.5.2 Corrective Action (CA)
1.5.2.1 Corrective Action Procedures
1.5.2.2 Corrective Action Request (CAR) Form
1.5.2.3 Corrective Action Log
1.5.3 Coatings Work Plan
1.5.4 Design Data
1.5.4.1 Containment System for Field Coating
1.5.5 Test Reports
1.5.5.1 Coatings Qualification Test Reports
1.5.5.2 Ferrous Metallic Abrasive Qualification Test Reports
1.5.5.3 Non-Metallic Abrasive Qualification Test Reports
1.5.5.4 Recycled Ferrous Metallic Abrasive Field Test Reports (Daily and Weekly)
1.5.6 Qualifications
1.5.6.1 Qualifications of Certified Industrial Hygienist (CIH)
1.5.6.2 Qualifications of Pipe Coating Shop
1.5.6.3 Qualifications of Certified Protective Coatings Specialist (PCS)
1.5.6.4 Qualifications of Coatings Inspection Company
1.5.6.5 Qualifications of Quality Assurance Coatings Inspector
1.5.6.6 Qualifications of Coatings Contractors for Field Coating
1.5.6.7 Qualifications of Individuals Performing Abrasive Blasting for Field Coating
1.5.6.8 Qualifications of Individuals Performing Coating Application for Field Coating
1.5.6.9 Qualifications of Testing Laboratory for Coatings

1.5.6.10 Qualifications of Testing Laboratory for Abrasive
1.5.6.11 Coating Materials Certificate of Conformance
1.5.6.12 Ferrous Metallic Abrasive Certificate of Conformance
1.5.6.13 Non-Metallic Abrasive Certificate of Conformance
1.5.7 QA and QC Personnel
1.5.7.1 QC Manager
1.5.7.2 Protective Coatings Specialist (PCS)
1.5.7.3 Quality Assurance Coatings Inspector
1.5.7.4 Coatings Inspector for Shop Coating
1.5.7.5 Coatings Contractor QC Coatings Inspector
1.5.8 Pre-Application Meeting for Field Coating
1.6 PRODUCT DATA
1.6.1 Coating System Instructions
1.7 DELIVERY AND STORAGE
1.8 COATING HAZARDS
1.9 JOB SITE REFERENCES - SHOP
1.10 JOB SITE REFERENCES - FIELD

PART 2 PRODUCTS

2.1 SHOP-APPLIED COATING FOR BURIED PIPING
2.1.1 External Pipe Coating
2.1.2 Internal Pipe Coating (Lining)
2.2 FIELD-APPLIED EXTERNAL PIPE COATING
2.3 COATING FIELD SAMPLE COLLECTION AND SHIPPING KIT
2.4 ABRASIVE FIELD SAMPLE COLLECTION AND SHIPPING KIT
2.5 INSPECTION TEST KITS
2.5.1 Test Kit for Measuring Chloride, Sulfate, and Nitrate Ions on Steel and Coated Surfaces
2.5.2 Test Kit for Measuring Chlorides in Abrasives
2.5.3 Test Kit for Identifying Amine Blush on Epoxy Surfaces
2.6 ABRASIVE
2.6.1 Ferrous Abrasive
2.6.1.1 New and Remanufactured Steel Grit
2.6.1.2 Recycled Steel Grit
2.6.2 Non-Metallic Abrasive

PART 3 EXECUTION

3.1 FIELD SAMPLE COLLECTION AND TESTING
3.1.1 Coating Field Sample Collection
3.1.2 Abrasive Field Sample Collection
3.1.3 Coating Field Test Reports
3.1.4 Abrasive Field Test Reports
3.2 LIGHTING
3.3 ENVIRONMENTAL CONDITIONS
3.3.1 Automated Monitoring Requirements for Shop Applied Coating
3.3.2 Containment for Field Coating
3.3.3 Automated Monitoring Requirements for Field Coating
3.4 SHOP APPLIED COATING OF BURIED PIPING
3.4.1 Surface Preparation for Shop Applied Coating
3.4.1.1 Abrasive Blasting Equipment for Shop Applied Coating of Buried Piping
3.4.1.2 Contamination Evaluation of Abrasive for Shop Applied Coating of Buried Piping
3.4.1.3 Pre-Preparation Testing for Surface Contamination for Shop Applied Coating of Buried Piping
3.4.1.3.1 Pre-Preparation Testing for Oil and Grease Contamination for Shop Applied Coating of Buried Piping

3.4.1.3.2 Pre-Preparation Testing for Soluble Salts Contamination for Shop Applied Coating of Buried Piping
3.4.1.4 Abrasive Blasting External Surfaces for Shop Applied Coating of Buried Piping
3.4.1.5 Abrasive Blasting Internal Surfaces for Shop Applied Coating of Buried Piping
3.4.1.6 Disposal of Used Abrasive for Shop Applied Coating of Buried Piping
3.4.1.7 Pre-Application Testing for Surface Contamination for Shop Applied Coating of Buried Piping
3.4.1.7.1 Pre-Application Testing for Oil and Grease Contamination for Shop Applied Coating of Buried Piping
3.4.1.7.2 Pre-Application Testing for Surface Cleanliness for Shop Applied Coating of Buried Piping
3.4.2 Mixing and Application of Shop Applied Coating of Buried Piping
3.4.2.1 Mixing Liquid Epoxy Coatings
3.4.2.2 External Pipe Shop Applied Coating Application
3.4.2.3 Internal Pipe Coating Application
3.4.2.4 Holiday Testing and Shop Repair
3.5 FIELD EXTERIOR COATING OF ABOVEGROUND PIPING
3.6 FIELD REPAIRS TO EXTERNAL COATING OF BURIED PIPING
3.6.1 Surface Preparation for Field Coating of Buried Piping
3.6.1.1 Abrasive Blasting Equipment for Field Coating of Buried Piping
3.6.1.2 Contamination Evaluation of Abrasive for Field Coating of Buried Piping
3.6.1.3 Surface Standard
3.6.1.4 Pre-Preparation Testing for Surface Contamination for Field Coating of Buried Piping
3.6.1.4.1 Pre-Preparation Testing for Oil and Grease Contamination for Field Coating of Buried Piping
3.6.1.4.2 Pre-Preparation Testing for Soluble Salts Contamination for Field Coating of Buried Piping
3.6.1.5 Abrasive Blasting for Field Coating of Buried Piping
3.6.1.6 Disposal of Used Abrasive for Field Coating of Buried Piping
3.6.1.7 Pre-Application Testing for Surface Contamination for Field Coating of Buried Piping
3.6.1.7.1 Pre-Application Testing for Oil and Grease Contamination for Field Coating of Buried Piping
3.6.1.7.2 Pre-Application Testing for Soluble Salts Contamination for Field Coating of Buried Piping
3.6.1.7.3 Pre-Application Testing for Surface Cleanliness for Field Coating of Buried Piping
3.6.2 Coating Mixing and Application for Field Coating of Buried Piping
3.6.2.1 Mixing Coating Materials for Field Coating of Buried Piping
3.6.2.2 Application Conditions and Recoat Windows for Field Coating of Buried Piping
3.6.2.3 Coating Application for Field Coating of Buried Piping
3.6.2.4 Holiday Testing and Field Repair
3.6.3 Final Inspection of Pipeline Prior to Burial
3.6.4 Final Cleanup
3.7 FIELD AND SHOP QUALITY CONTROL
3.7.1 Inspection
3.7.1.1 Inspection Requirements
3.7.1.2 Inspection Report Forms
3.7.1.3 Daily Inspection Reports
3.7.1.4 Inspection Logbook

3.7.1.5 Inspection Equipment
3.7.2 Coatings Contractor QC Coatings Inspector's Responsibilities
3.7.3 Quality Assurance Coatings Inspector's Responsibilities
3.8 PROJECT IDENTIFICATION
3.8.1 Stencils
3.8.2 Nameplates

-- End of Section Table of Contents --

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USACE / NAVFAC / AFCEC / NASA | UFGS-33 52 80 (August 2022)

Preparing Activity: NAVFAC | Superseding
UFGS-33 52 80 (February 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

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****

SECTION 33 52 80

LIQUID FUELS PIPELINE COATING SYSTEMS
08/22

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NOTE: This guide specification covers the requirements for interior and exterior coating of aboveground and buried carbon steel liquid fuel pipelines and exterior coating of aboveground and buried stainless steel liquid fuel pipelines. The exterior coating system for aboveground pipelines is the same as used on the exterior of fuel tanks, Section 09 97 13.27 HIGH PERFORMANCE COATING FOR STEEL STRUCTURES. The exterior coating system for buried pipelines is an extruded polyolefin system, a fusion bonded epoxy (FBE) system, or a liquid epoxy system. An optional FBE coating or liquid applied epoxy coating system is provided for the interior of carbon steel pipe to protect aviation fuel from iron contamination.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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NOTE: This guide specification is intended for coating of new pipe and localized field repairs only. For maintenance coating of existing buried or aboveground pipe, a coating inspection, or coating

condition survey (CCS), as described in Section 09 97 13.27 HIGH PERFORMANCE COATING FOR STEEL STRUCTURES, should be accomplished prior to designing the coating project. Without a competent inspection, there is no reliable way to determine the type or condition of the existing coating system. If existing conditions are not known, proper (effective and financially supportable) surface preparation or coating system selection cannot be made.
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NOTE: This specification is the result of much experience and expertise of Association for Materials Protection and Performance (AMPP) (previously SSPC) certified Protective Coatings Specialists.

A specifier, in adapting this specification to a project, should not alter the products and processes specified herein without thorough knowledge of the need for the changes and the implications of those changes.

Prior to changing or altering the products or processes specified herein, it is recommended that the specifier consult with the NAVFAC Paints and Coatings Subject Matter Expert at Naval Facilities Engineering Service Center.
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NOTE: SSPC and NACE have merged to become AMPP. The merger was still in progress at the time this section was released.
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NOTE: The metric standard for measuring coating thickness is microns (25.4 microns=1 mil; use nominal 25 microns=1 mil).
****

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NOTE: Designers are encouraged to contact Robert Jamond (robert.jamond@navy.mil) prior to beginning a new Navy design.
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NOTE: Designers are encouraged to contact the Air Force Civil Engineer Reachback Center (afcec.rbc@us.af.mil) prior to beginning a new Air Force design.
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PART 1 GENERAL

1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C203	(2020) Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot-Applied
AWWA C209	(2019) Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections and Fitting for Steel Water Pipelines
AWWA C210	(2015) Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
AWWA C213	(2022) Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings
AWWA C215	(2022) Extruded Polyolefin Coatings for Steel Water Pipe
AWWA C216	(2022) Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines
AWWA C217	(2023) Microcrystalline Wax and Petrolatum Tape Coating Systems for Steel Water Pipe and Fittings

ASTM INTERNATIONAL (ASTM)

ASTM D3276	(2015; E 2016) Standard Guide for Painting Inspectors (Metal Substrates)
ASTM D3335	(1985a; R 2020) Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
ASTM D3718	(1985a; R 2015) Low Concentrations of Chromium in Paint by Atomic Absorption Spectroscopy
ASTM D3925	(2002; R 2015) Sampling Liquid Paints and Related Pigmented Coatings
ASTM D4285	(1983; R 2018) Indicating Oil or Water in Compressed Air
ASTM D4417	(2021) Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 8502-3	(2017) Preparation of Steel Substrates Before Application of Paints and Related Products - Tests for the Assessment of Surface Cleanliness - Part 3: Assessment of Dust on Steel Surfaces Prepared for Painting (Pressure-Sensitive Tape Method)
ISO 9001	(2015) Quality Management Systems-Requirements

MASTER PAINTERS INSTITUTE (MPI)

MPI 500	(2020) Epoxy, Interior Steel Fuel Tank Coating, Primer
MPI 501	(2020) Epoxy, Interior Steel Fuel Tank Coating, Contrast Topcoat

NACE INTERNATIONAL (NACE)

NACE RP0402	(2002) Field-Applied Fusion-Bonded Epoxy (FBE) Pipe Coating Systems for Girth Weld Joints: Application, Performance, and Quality Control

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC AB 1	(2015; E 2017) Mineral and Slag Abrasives
SSPC AB 2	(2015; E 2016) Cleanliness of Recycled Ferrous Metallic Abrasive
SSPC AB 3	(2003; E 2004) Ferrous Metallic Abrasive

SSPC Guide 6	(2021) Guide for Containing Surface Preparation Debris Generated During Paint Removal Operations
SSPC Guide 12	(2023) Guide for Illumination of Industrial Painting Projects
SSPC PA 1	(2016) Shop, Field, and Maintenance Coating of Metals
SSPC PA 2	(2015; E 2018) Procedure for Determining Conformance to Dry Coating Thickness Requirements
SSPC QP 1	(2019) Standard Procedure for Evaluating the Qualifications of Industrial/Marine Painting Contractors (Field Application to Complex Industrial Steel Structures and Other Metal Components)
SSPC QP 3	(2010) Standard Procedure for Evaluating Qualifications of Shop Painting Applicators
SSPC QP 5	(2022) Standard Procedure for Evaluating the Qualifications of Coating and Lining Inspection Companies
SSPC QS 1	(2015) Standard Procedure for Evaluating a Contractor's Advanced Quality Management System
SSPC SP 1	(2015) Solvent Cleaning
SSPC SP 10/NACE No. 2	(2015) Near-White Blast Cleaning
SSPC SP 17	(2019) Thorough Abrasive Blast Cleaning of Non-Ferrous Metals
SSPC VIS 1	(2002; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910-SUBPART Z	Toxic and Hazardous Substances
29 CFR 1910.134	Respiratory Protection
29 CFR 1910.1000	Air Contaminants
29 CFR 1926.59	Hazard Communication

1.2 SYSTEM DESCRIPTION

This section specifies the requirements for[interior and] exterior coating of aboveground and buried carbon steel liquid fuel pipelines and exterior coating of aboveground and buried stainless steel liquid fuel pipelines. The exterior coating system for aboveground, carbon steel pipelines is specified with the same requirements as the exterior coating

system for the exterior of fuel tanks, Section 09 97 13.27 HIGH PERFORMANCE COATING FOR STEEL STRUCTURES. The exterior coating system for buried pipelines is an extruded polyolefin system, a fusion bonded epoxy (FBE) system, or a liquid epoxy system.[The interior coating system for carbon steel pipelines is an FBE coating system or liquid applied epoxy system coating. An interior coating system is specified for the interior of carbon steel pipe containing aviation fuel to protect the fuel from iron contamination.]

1.3 DEFINITIONS

Definitions are generally provided throughout this Section in the paragraphs where used and denoted by capital letters. The following definition is used throughout this Section:

a. INDEPENDENT THIRD-PARTY - Impartial third-party not a part or affiliated with Contractor or subcontractor principal or subsidiary businesses, and not a materials supplier.

1.4 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G". Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" or "S"

classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contract Errors, Omissions, and Other Discrepancies

Corrective Action Procedures

Corrective Action Request (CAR) Form

Coatings Work Plan

Inspection Report Forms

SD-05, Design Data

Containment System

SD-06 Test Reports

Daily Inspection Reports

Coatings Qualification Test Reports

Ferrous Metallic Abrasive Qualification Test Reports

Non-Metallic Abrasive Qualification Test Reports

Coating Field Test Reports

Abrasive Field Test Reports

Recycled Ferrous Metallic Abrasive Field Test Reports (Daily and Weekly)

SD-07 Certificates

Qualifications of Certified Industrial Hygienist (CIH)

Qualifications of Pipe Coating Shop

Qualifications of Certified Protective Coatings Specialist (PCS)

Qualifications of Coatings Inspection Company

Qualifications of Quality Assurance Coatings Inspector

Qualifications of Coatings Contractors for Field Coating

Qualifications of Individuals Performing Abrasive Blasting for Field Coating

Qualifications of Individuals Performing Coating Application for Field Coating

Qualifications of Testing Laboratory for Coatings

Qualifications of Testing Laboratory for Abrasive

Coating Materials Certificate of Conformance

Ferrous Metallic Abrasive Certificate of Conformance

Non-Metallic Abrasive Certificate of Conformance

SD-08 Manufacturer's Instructions

Coating System Instructions

SD-11 Closeout Submittals

Disposal of Used Abrasive Shop Applied Coating

Disposal of Used Abrasive Field Applied Coating

Inspection Logbook

Corrective Action Log; G[, [_____]]

1.5 QUALITY ASSURANCE

1.5.1 Contract Errors, Omissions, and Other Discrepancies

Submit all errors, omissions, and other discrepancies in contract documents to the Contracting Officer within 30 days of contract award for all work covered in this Section, other than the work that will not be uncovered until a later date. All such discrepancies must be addressed and resolved, and the Coatings Work Plan modified, prior to beginning the Initial and Follow-Up phases of work. Discrepancies that become apparent only after work is uncovered must be identified at the earliest discoverable time and submitted for resolution. Schedule time (float) must be built into the project schedule at those points where old work is to be uncovered or where access is not available during the first 30 days after award, to allow for resolution of contract discrepancies.

1.5.2 Corrective Action (CA)

CA must be included in the Contractor Quality Control Plan as outlined in Section 01 45 00 QUALITY CONTROL.

1.5.2.1 Corrective Action Procedures

Develop procedures for determining the root cause of each non-compliance, developing a plan to eliminate the root cause so that the non-compliance does not recur, and following up to ensure that the root cause was eliminated.

1.5.2.2 Corrective Action Request (CAR) Form

Develop Corrective Action Request (CAR) forms for initiating CA and for tracking and documenting each step. The CAR should be included with the Corrective Action Procedures. A CAR must be initiated by either the Contractor or the Contracting Officer. The Protective Coatings Specialist (PCS) must approve each CAR at the root cause identification stage, the

plan for elimination stage, and the close out stage after verification that the root cause has been eliminated.

1.5.2.3 Corrective Action Log

When a CAR is initiated, Contractor must take action to identify and eliminate the root cause of each non-compliance so as to prevent recurrence. These actions must apply to non-compliance in the work, and to non-compliance in the Quality Control (QC) System. Corrective actions must be appropriate to the effects of the non-compliance encountered. The corrective action must be documented in a report that is serialized and tracked in the Corrective Action Log until project completion and its acceptance by the Contracting Officer. All corrective action reports must be retained in project records. The Corrective Action Log, showing status of each CAR, must be submitted to the Contracting Officer monthly.

1.5.3 Coatings Work Plan

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NOTE: Ensure coordination between all parties, including the welder, weld inspector, coatings Contractor, Quality Assurance Coatings Inspector, and Coatings Contractor QC Coatings Inspector, on weld preparation and surface profile requirements.
****

This work plan must be considered as part of the Contractor Quality Control Plan as outlined in Section 01 45 00 QUALITY CONTROL.

The Coatings Work Plan must be submitted and approved by the PCS prior to mobilization. The Coatings Work Plan must explain in detail all procedures including, but not limited to, all sequential processes, quality control for each process, quality assurance for each process, and safety considerations. Subsections must include at least the following:

a. Purpose;

b. Introduction[(including the scope of work (SOW) project program)];

c. Safety, fire, and health information;

d. Contractor and worker qualifications with certifications;

e. Project management organization and documents;

f. Timeline in a Gantt chart;

g. Project document references;

h. Reference to all applicable standards (e.g., AMPP, NACE, SSPC, ISO, and ASTM);

i. Coatings manufacturer's supporting documentation;

j. Descriptions and explanations of any exceptions from the coating manufacturer[(including those specific to stainless steel piping];

k. Coating and blasting equipment, model names, and, if applicable, calibration dates;

l. Containment design and/or details;

m. Environmental testing;

n. Material delivery, storage, and handling details;

o. Surface preparation;

p. Pre-application test panel validation for field-applied external coating as outlined in SURFACE STANDARD;

q. Coating materials, mixing, application, recoat windows, and coating curing times, if applicable;

r. Coating repairs and rework;

s. Non-conformance;

t. Spent material handling and effluent discharge containment and disposal;

u. Inspection test plan (as outlined in FIELD INSPECTION, and including inspection hold points, both Quality Assurance and Coating Contractor QC Coatings Inspector's responsibilities, and daily documentation and delivery);

v. Instruments and test kits;

w. Warranty (in writing, signed by the Contractor and the coating manufacturer's representative);

x. Demobilization;

y. PCS and PM approval;

1.5.4 Design Data

1.5.4.1 Containment System for Field Coating

Submit complete design drawings and calculations for the scaffolding and containment system, including an analysis of the loads which will be added to the structure by the containment system and waste materials. A registered engineer must approve calculations and scaffold system design.

1.5.5 Test Reports

1.5.5.1 Coatings Qualification Test Reports

****

NOTE: Delete the bracketed coating systems that will not be used for this project. All coating systems, including shop applied external coatings, shop applied internal coatings, and field repair coatings, must be listed for qualification testing.

****

Submit test results from an INDEPENDENT THIRD-PARTY laboratory of representative samples of each coating material. U.S. Department of

Defense laboratories are considered to be INDEPENDENT THIRD-PARTY laboratories. Samples must have been tested within the last three years. The purpose of qualification testing is to pre-qualify the coatings used on buried pipe. Provide qualification testing results for exterior coatings used for repairs or girth welds on buried pipe in conformance with [AWWA C203][AWWA C209][AWWA C210][AWWA C216][AWWA C217][NACE RP0402]. Provide qualification testing results for shop applied exterior coatings for buried pipe in conformance with [AWWA C210][AWWA C213][AWWA C215].[Provide qualification testing results for shop applied internal coatings for buried pipe in conformance with [AWWA C213][MPI 500 and MPI 501].]

Qualification testing must be based on all required production verification testing required by [AWWA C203][AWWA C209][AWWA C210][AWWA C216][AWWA C217][NACE RP0402][AWWA C213][AWWA C215][MPI 500 and MPI 501].[For AWWA C213, provide test reports for production verification testing described in paragraph OPTIONAL EPOXY PERFORMANCE TESTING OF COATED PIPE of AWWA C213, including cross-section porosity, interface porosity, thermal analysis (DSC), permanent strain (bendability), and interfacial contamination. Perform production verification testing on a minimum of one pipe joint in the first half hour of production each day, and on a minimum of one pipe joint in the last half hour of production each day. Perform additional testing as required to segregate any non-compliant material.]

1.5.5.2 Ferrous Metallic Abrasive Qualification Test Reports

Submit qualification testing results for abrasive as required in paragraph 4 REQUIREMENTS of SSPC AB 3. Submit test results from an INDEPENDENT THIRD-PARTY laboratory of representative samples of each abrasive to be used on the jobsite. Samples must have been tested within the last three years. Note that this testing is for the purpose of pre-qualifying the abrasive.

1.5.5.3 Non-Metallic Abrasive Qualification Test Reports

Submit results for abrasive as required in paragraph 4 REQUIREMENTS of SSPC AB 1. Submit test results from an INDEPENDENT THIRD-PARTY laboratory of representative samples of each abrasive to be used on the jobsite. Samples must have been tested within the last three years. Note that this testing is for the purpose of pre-qualifying the abrasive.

1.5.5.4 Recycled Ferrous Metallic Abrasive Field Test Reports (Daily and Weekly)

Submit test results from an INDEPENDENT THIRD-PARTY laboratory of daily and weekly Quality Control testing required by SSPC AB 2, as modified in paragraph ABRASIVE.

1.5.6 Qualifications

The qualifications specified in this Section must be met throughout the duration of this contract. Personnel and corporate entities must provide proof of active certification to all qualifications specified in this Section. Work must not be provided by personnel and corporate entities unless all specified qualifications are met.

1.5.6.1 Qualifications of Certified Industrial Hygienist (CIH)

Submit name, address, telephone number, fax number, and e-mail address of the INDEPENDENT THIRD-PARTY CIH. Submit documentation that the hygienist is certified by the American Board of Industrial Hygiene in comprehensive practice, including certification number and date of certification/recertification. The CIH must remain certified during the entire project, and the Contracting Officer must be notified of any change in certification status within 10 days of the change. If a CIH's certification expires, the hygienist will not be allowed to perform any hygienist functions, and all hygienist work must stop, until the certification is reissued or another CIH is approved. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Provide evidence of experience with hazards involved in industrial coating application work.

1.5.6.2 Qualifications of Pipe Coating Shop

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NOTE: Solicitations requiring certification for pre-qualification must point out the existence and location of the certification requirement on the PROJECT INFORMATION FORM. This requirement must be pointed out in the solicitation documents for the "prior to contract award" requirement to be enforceable. Certification is a special responsibility requirement pursuant to FAR 9.104-2 Special Standards. This is analogous to requiring bidders to have a specified level of experience or expertise and GAO has sustained these types of special requirements.

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Each shop that applies coatings to pipe must be certified to SSPC QP 3 prior to contract award and must remain certified while accomplishing any surface preparation or coating application. If a shop's certification expires, the firm will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Contracting Officer of any change in the shop's certification status within 10 days of the change. If a shop's qualification expires, the shop will not be allowed to perform any coatings related functions until the qualification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive qualification will not be considered and liquidated damages will apply. Notify the Contracting Officer of all scheduled and unannounced on-site audits from AMPP and furnish a copy of all audit reports.

[For shops located outside the United States, Guam, and Puerto Rico, the certifications for the shop (SSPC QP 3) can be substituted if the coatings Contractor meets all of the below requirements:

a. ISO 9001 certified;

b. Eight years of experience with industrial coatings;

c. Evidence of recent work that has Contractor Performance Assessment

Report System (CPARS) ratings, and/or other quality/performance ratings, that are equivalent to, or exceed, "Above Average";

d. Evidence of an INDEPENDENT THIRD-PARTY audit from AMPP demonstrating equivalency to SSPC QP 3 within the last two years.

The shop must be certified to ISO 9001 prior to contract award and must remain so certified for the duration of the project. Notify the Contracting Officer of any change in the shop's certification status within 10 days of the change. If a Contractor's qualification expires, the shop will not be allowed to perform any coatings related functions until the qualification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive qualification will not be considered and liquidated damages will apply. Notify the Contracting Officer of all scheduled and unannounced on-site inspections from the ISO certifying organization and furnish a copy of all inspection reports.

]1.5.6.3 Qualifications of Certified Protective Coatings Specialist (PCS)

Submit name, address, telephone number, fax number, and e-mail address of the INDEPENDENT THIRD-PARTY PCS. Submit documentation that the PCS is certified by the Association for Materials Protection and Performance (AMPP) (formerly SSPC: The Society for Protective Coatings (SSPC)), including certification number and date of certification/recertification. If the PCS is employed by the same coatings inspection company to which the Quality Assurance Coatings Inspector is employed, this does not violate the INDEPENDENT THIRD-PARTY requirements. The PCS must be an INDEPENDENT THIRD-PARTY to the pipe coating shop. The PCS must remain certified during the entire project, and the Contracting Officer must be notified of any change in certification status within 10 days of the change. If a PCS's certification expires, the PCS will not be allowed to perform any PCS functions, and all coatings work must stop, until the certification is reissued or another PCS is approved. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. The PCS must not be the designated Quality Assurance Coatings Inspector. The PCS's responsibilities are outlined in PROTECTIVE COATINGS SPECIALIST (PCS).

1.5.6.4 Qualifications of Coatings Inspection Company

Submit documentation that the selected quality assurance coatings inspection company is accredited by AMPP to the requirements of SSPC QP 5 prior to contract award. The coatings inspection company that is submitted and approved, must remain and cannot be changed through completion of the contract. The coatings inspection company must remain SSPC QP 5 certified for the duration of the coatings work. If a coatings inspection company's certification expires, the firm will not be allowed to perform any inspection functions, and all surface preparation and coating application work must stop, until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Contracting Officer of any change in the coatings inspection company certification status within 10 days of the change. Notify the Contracting Officer of all scheduled and unannounced on-site audits from AMPP and furnish a copy of all audit reports. The coatings inspection company must not engage in any activities that may conflict with their independence of judgment and

integrity in relation to their inspection activities. In particular, they must not be engaged in the manufacture, supply, application, surface preparation, purchase, or maintenance of the applied coating in this project.

1.5.6.5 Qualifications of Quality Assurance Coatings Inspector

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NOTE: Although the Quality Assurance Coatings Inspector may be a certified NACE CIP Level III inspector, the Quality Assurance Coatings Inspector must be employed by a certified QP 5 coatings inspection company.

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Submit documentation that each Quality Assurance Coatings Inspector is employed by the SSPC QP 5 company and is qualified to a minimum certification of NACE CIP Level II. Each inspector must remain employed by the coatings inspection company while performing any coatings inspection functions. The Quality Assurance Coatings Inspector's responsibilities are outlined in QUALITY ASSURANCE COATINGS INSPECTOR'S FIELD RESPONSIBILITIES. The roles of the Quality Assurance Coatings Inspector are in addition to, and distinct from, the role of the QC Coatings Inspector employed by the coatings Contractor and the Coatings Inspector for Shop Coating.

1.5.6.6 Qualifications of Coatings Contractors for Field Coating

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NOTE: If project involves removal of paint containing hazardous materials, add requirement for SSPC QP 2 certification in section of specification where the hazardous paint removal is specified, generally Section 02 83 00 LEAD REMEDIATION.

****

All Contractors and Subcontractors that perform surface preparation or coatings application must be certified to SSPC QP 1 and SSPC QS 1 prior to contract award and must remain certified while accomplishing any surface preparation or coating application. If a Contractor's or Subcontractor's certification expires, the firm will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Contracting Officer of any change in Contractor certification status within 10 days of the change. If a Contractor's qualification expires, the Contractor will not be allowed to perform any coatings related functions until the qualification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive qualification will not be considered and liquidated damages will apply. Notify the Contracting Officer of all scheduled and unannounced on-site audits from AMPP and furnish a copy of all audit reports.

[For projects located outside the United States, Guam, and Puerto Rico, the certifications for the coatings Contractor (SSPC QP 1 and SSPC QS 1) can be substituted if the coatings Contractor meets all of the below requirements:

a. ISO 9001 certified;

b. Eight years of experience with industrial coatings;

c. Evidence of recent work that has Contractor Performance Assessment Report System (CPARS) ratings, and/or other quality/performance ratings, that are equivalent to, or exceed, "Above Average";

d. Evidence of an INDEPENDENT THIRD-PARTY audit from AMPP demonstrating equivalency to SSPC QP 1 and SSPC QS 1 within the last two years.

The coatings Contractors and coatings Subcontractors must be certified to ISO 9001 prior to contract award and must remain so certified for the duration of the project. Notify the Contracting Officer of any change in Contractor certification status within 10 days of the change. If a Contractor's qualification expires, the Contractor will not be allowed to perform any coatings related functions until the qualification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive qualification will not be considered and liquidated damages will apply. Notify the Contracting Officer of all scheduled and unannounced on-site inspections from the ISO certifying organization and furnish a copy of all inspection reports.

]1.5.6.7 Qualifications of Individuals Performing Abrasive Blasting for Field Coating

Submit name, address, and telephone number of each person that will be performing abrasive blasting. All individuals performing abrasive blasting must be certified by AMPP to the SSPC C7 Dry Abrasive Blaster Qualification Program or CAS Coating Application Specialist Level 2 Certification Program (Interim Status), and must remain certified during the entire period of abrasive blasting. The Contracting Officer must be notified of any change in qualification status within 10 days of the change. If a blaster's qualification expires, the blaster will not be allowed to perform any blasting functions until the qualification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive qualification will not be considered and liquidated damages will apply.

This requirement applies to all manual abrasive blasting performed in shop and field locations. This requirement does not apply to automated abrasive blasting performed in the shop.

1.5.6.8 Qualifications of Individuals Performing Coating Application for Field Coating

Submit name, address, telephone number, and evidence of certification of each person that will be performing coatings application by any method. All individuals performing coatings application must be certified by AMPP to the SSPC CAS Coating Application Specialist Level 2 Certification Program (Interim Status) or SSPC C12 Spray Application Program. Each applicator must remain certified during the entire period of coatings application, and the Contracting Officer must be notified of any change in qualification status within 10 days of the change. If an applicator's qualification expires, the applicator will not be allowed to perform any coatings application functions until the qualification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive qualification will not be considered and liquidated damages will apply.

1.5.6.9 Qualifications of Testing Laboratory for Coatings

Submit name, address, telephone number, fax number, and e-mail address of the INDEPENDENT THIRD-PARTY laboratory or laboratories selected to perform testing of coating samples for qualification testing and for field sample testing for compliance with this Section. Submit documentation that the laboratory is regularly engaged in testing of paint samples for conformance with specifications and that the employees performing testing are qualified.

1.5.6.10 Qualifications of Testing Laboratory for Abrasive

Submit name, address, telephone number, fax number, and e-mail address of the INDEPENDENT THIRD-PARTY laboratory or laboratories selected to perform testing of abrasive for compliance with this section. Submit documentation that the laboratory has experience in testing samples of abrasive for conformance with specifications and that the employees performing testing are qualified.

1.5.6.11 Coating Materials Certificate of Conformance

Provide manufacturer's certification of conformance to [AWWA C203][AWWA C209][AWWA C210][AWWA C216][AWWA C217][NACE RP0402] for exterior coatings used for repairs or girth welds on buried pipe. Provide manufacturer's certification of conformance to [AWWA C210][AWWA C213][AWWA C215] for shop applied exterior coatings for buried pipe.[Provide manufacturer's certification of conformance to [AWWA C213][MPI 500 and MPI 501] for shop applied internal coatings for buried pipe.]

[For carbon steel internal liners ([AWWA C213][MPI 500 and MPI 501]), a certification must be provided from the coating manufacturer stating that the coating system is suitable for immersion service in aviation fuel.

]1.5.6.12 Ferrous Metallic Abrasive Certificate of Conformance

Provide manufacturer's certification of conformance that the materials are currently in conformance with SSPC AB 3 and as modified in this Section, and have been tested within the last three years.

1.5.6.13 Non-Metallic Abrasive Certificate of Conformance

Provide manufacturer's certification that the materials are currently in conformance with SSPC AB 1 and as modified in this Section, and have been tested within the last three years.

1.5.7 QA and QC Personnel

1.5.7.1 QC Manager

The QC Manager is as defined in Section 01 45 00 QUALITY CONTROL.

1.5.7.2 Protective Coatings Specialist (PCS)

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NOTE: Specifier of this section shall ensure coordination with the related "QC Specialist" specification in Section 01 45 00 QUALITY CONTROL, as applicable. Provide the required data to complete the "QC Specialist" specifications of that

Section.
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The PCS must be considered a QC Specialist and must report to the QC Manager, as specified in Section 01 45 00 QUALITY CONTROL. The PCS must approve all submittals prior to submission to the QC Manager for approval or submission to the government for approval.

The PCS's responsibilities include, but are not limited to, the following:

a. Obtain, review, and understand all project documentation including, but not limited to, this Section, scope of work (SOW) project program, Coatings Work Plan, inspection and testing plan (ITP), and all submittals before the project starts, during the project, and all coatings related re-work;

b. Attend all pre-job coatings meetings (in-person, phone, or virtually);

c. Attend pre-final coatings walk-through (mandatory) and attend final coatings walk-through (as required).

1.5.7.3 Quality Assurance Coatings Inspector

The Quality Assurance Coatings Inspector must be considered a QC Specialist and must report to the QC Manager, as specified in Section 01 45 00 QUALITY CONTROL. The Quality Assurance Coatings Inspector must be present during all pre-preparation testing, surface preparation, coating application, initial cure of the coating system, during all coating repair work, and during completion activities. The Quality Assurance Coatings Inspector must provide complete documentation of conditions and occurrences on the job site, and be aware of conditions and occurrences that are potentially detrimental to the coating system. The responsibilities of the Quality Assurance Coatings Inspector are defined in QUALITY ASSURANCE COATING INSPECTOR'S RESPONSIBILITIES. These responsibilities are separate and distinct from the responsibilities of the Coatings Contractor QC Coatings Inspector and Coatings Inspector for Shop Coating.

1.5.7.4 Coatings Inspector for Shop Coating

The coatings inspector must be the shop Quality Manager or appropriate designee. The coatings inspector must be considered a QC Specialist and must report to the prime Contractor's QC Manager, as specified in Section 01 45 00 QUALITY CONTROL. The coatings inspector must be present during all pre-preparation testing, surface preparation, coating application, initial cure of the coating system, and during all coating repair work required of the shop. The coatings inspector must provide complete documentation of conditions and occurrences on the job site, and be aware of conditions and occurrences that are potentially detrimental to the coating system.

1.5.7.5 Coatings Contractor QC Coatings Inspector

The Coatings Contractor QC Coatings Inspector must stop non-compliant work. The responsibilities of the Coatings Contractor QC Coatings Inspector are defined in COATINGS CONTRACTOR QC COATINGS INSPECTOR'S RESPONSIBILITIES. These responsibilities are separate and distinct from the responsibilities of the Quality Assurance Coatings Inspector.

1.5.8 Pre-Application Meeting for Field Coating

After approval of submittals, but prior to the initiation of coatings work, Contractor representatives, including at a minimum, project superintendent, QC manager, paint foreman, Quality Assurance Coatings Inspector, and PCS must have a pre-application coating preparatory meeting. This meeting must be in addition to the pre-construction conference. Specific items addressed must include: corrective action requirements and procedures, coatings work plan, safety plan, coordination with other Sections, inspection standards, inspection requirements and tools, test procedures, environmental control system, safety plan, and test logs. Notify Contracting Officer at least ten days prior to meeting.

1.6 PRODUCT DATA

1.6.1 Coating System Instructions

Submit manufacturer's printed instructions, including detailed mixing and application procedures, number and types of coats required, minimum and maximum application temperatures, and curing procedures of all coating materials. Include Safety Data Sheets (SDS) for materials to be used at the job site in accordance with 29 CFR 1926.59.

1.7 DELIVERY AND STORAGE

Ship, store, and handle materials in accordance with SSPC PA 1, applicable standards, and as modified in this Section. Maintain temperature in storage spaces between 5 and 24 degrees C 40 and 75 degrees F, and air temperature more than 3 degrees C 5 degrees F above the dew-point at all times. Inspect materials for damage and return non-compliant materials to manufacturer. Remove materials with expired shelf life from government property immediately and notify the Contracting Officer.

If materials are approaching shelf life expiration and an extension is desired, samples must be sent to the manufacturer, along with complete records of storage conditions, with a request for shelf life extension. If the manufacturer finds the samples and storage data suitable for shelf life extension, the manufacturer must issue an extension, referencing the product evaluation and the review of storage records. Products must not be extended longer than allowed in the product specification.

1.8 COATING HAZARDS

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NOTE: This specification Section must be used with Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS.

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Ensure that employees are trained in all aspects of the safety plan. Specified coatings may have potential health hazards if ingested or improperly handled. The coating manufacturer's written safety precautions must be followed throughout mixing, application, and curing of the coatings. During cleaning, cleanup, surface preparation, and paint application phases, ensure that employees are protected from toxic and hazardous chemical agents which exceed concentrations in 29 CFR 1910.1000. Comply with respiratory protection requirements in 29 CFR 1910.134. The CIH must approve work procedures and personal protective equipment.

1.9 JOB SITE REFERENCES - SHOP

Make available to the Contracting Officer a copy of each standard to which the shop will be applying coatings under this Section.

1.10 JOB SITE REFERENCES - FIELD

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NOTE: Include any other references that might be added during design.
****

Make available to the Contracting Officer a copy of each standard to which field coatings will be applied to under this Section, and an SSPC Certified Contractor Evaluation Form at the job site.

PART 2 PRODUCTS

2.1 SHOP-APPLIED COATING FOR BURIED PIPING

2.1.1 External Pipe Coating

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NOTE: For carbon steel, use the first bracketed option (AWWA C215 Extruded Polyolefin Coatings for Steel Water Pipe) for normal situations, or the second option (AWWA C213 Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings) where fuel contaminated soil is anticipated.

For stainless steel, use the bracketed first bracketed option (AWWA C210 Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings or AWWA C215 Extruded Polyolefin Coatings for Steel Water Pipe) for normal situations, or the second bracketed option (AWWA C213 Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings) where fuel contaminated soil is anticipated.
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NOTE: When using AWWA standards for stainless steel, most coating manufacturers will require exceptions. Some of these exceptions will include a lower rating for cathodic disbondment. Ensure that this lower rating will not alter the warranty and will be sufficient to protect the pipe in the environment it is exposed to.
****

[For carbon steel, extruded polyolefin coating over soft adhesive: AWWA C215.][For carbon steel, FBE coating: AWWA C213.]

[For stainless steel, liquid applied epoxy coating: AWWA C210.][For stainless steel, FBE coating: AWWA C213.][For stainless steel, extruded polyolefin: AWWA C215.]

[2.1.2 Internal Pipe Coating (Lining)

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NOTE: Delete requirement for lining where not required to protect aviation fuel. Internal linings and coatings must not be used for stainless steel piping.

****

[For carbon steel, FBE coating: AWWA C213.][For carbon steel, liquid applied epoxy coating system: MPI 500 and MPI 501.] A certification must be provided from the coating manufacturer stating that the coating system is suitable for immersion service in aviation fuel.

]2.2 FIELD-APPLIED EXTERNAL PIPE COATING

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NOTE: Use the first bracketed portion where the shop-applied exterior coating is the AWWA C215 coating. Use the second bracketed portion when the exterior coating is the AWWA C213 coating. Use the third bracketed portion where the shop-applied exterior coating is the AWWA C210 coating.

While other methods of repairing/girth weld coating of FBE coatings are usable according to the standard, the options allowed here are limited to those that will provide satisfactory service in fuel contaminated soil.

****

All coating materials used to coat external girth welds or repair existing coating must be from the same manufacture as the shop applied coating. Use one or more of the following repair methods, as modified herein, to repair shop applied coatings and coat external girth welds:

[a. Coal Tar Enamel: AWWA C203, Type II enamel, Type III outerwrap

b. Coal Tar Tape: AWWA C203

c. Cold Applied Tape: AWWA C209

d. Petrolatum or Petroleum Wax Tape Coating: AWWA C217

e. Heat Shrink Sleeve: AWWA C216

][a. Fusion-Bonded Epoxy (FBE) Coating: NACE RP0402, coating material to be same as applied to pipe in shop

b. Liquid-Epoxy Coating System: AWWA C210

][a. Liquid-Epoxy Coating System: AWWA C210

]2.3 COATING FIELD SAMPLE COLLECTION AND SHIPPING KIT

Provide a kit for each sample to be collected. For FBE coatings, each kit must contain: a one liter quart can for the dry/powder; dipping cups for sampling; a shipping box sized for the samples to be shipped; and packing

material. For liquid coatings, each kit must contain: a one liter quart can for the base of each liquid coatings material; one appropriately sized can for the activator of each liquid coatings material; dipping cups for each component to be sampled; a shipping box sized for the samples to be shipped; and packing material. Mark cans for the appropriate components (powder, base, or activator), including manufacturer's name, address, batch numbers, batch size shipped to the project site, and date of manufacture. Provide shipping documents, including either pre-paid shipping or a shipping number that can be used by the QC Manager to arrange pickup, addressed to the INDEPENDENT THIRD-PARTY coating testing laboratory.

2.4 ABRASIVE FIELD SAMPLE COLLECTION AND SHIPPING KIT

Provide a kit for each sample to be collected. Each kit must contain: one suitable plastic bag or container for each sample to be collected. Mark containers with manufacturer's name, address, batch number, batch size, and date of manufacture. Provide shipping documents, including either pre-paid shipping label or a shipping number that can be used by the QC Manager to arrange pickup, addressed to the approved coating testing laboratory.

2.5 INSPECTION TEST KITS

2.5.1 Test Kit for Measuring Chloride, Sulfate, and Nitrate Ions on Steel and Coated Surfaces

Provide test kits that meet the following requirements:

a. Contains all materials, supplies, tools, and instructions for field testing and on-site quantitative evaluation of chloride, sulfate, and nitrate ions;

b. Extract solution is acidic, factory pre-measured, pre-packaged, and of uniform concentration;

c. Components and solutions are mercury free and environmentally friendly;

d. Contains new materials and solutions for each test extraction;

e. Contains an extraction test container (vessel, sleeve, cell) creates a sealed, encapsulated environment during salt ion extraction;

f. Contains a test extract container is suitable for testing the following steel surfaces: horizontal (up/down configuration), vertical, flat, curved, smooth, pitted, and rough;

g. All salt ion concentrations are directly measured in micrograms per square centimeter.

2.5.2 Test Kit for Measuring Chlorides in Abrasives

Provide test kits that meet all of the following requirements:

a. Be a completely self-contained test kit with all materials, supplies, tools, and instructions to take tests and identify results;

b. Use identifiable, consistent, factory pre-measured test extract solution;

c. Provide for testing equal volumes of abrasive and test solution;

d. Provide for taking direct measurements of the chloride ion in parts per million (PPM), without using conversion charts or tables;

e. Provide all new components for extraction and titration for each test;

f. Provide a factory sealed titration device for each test;

g. Use the extract sampling container as the titration container.

2.5.3 Test Kit for Identifying Amine Blush on Epoxy Surfaces

Provide test kits that meet all of the following requirements:

a. Be a completely self-contained field test kit with all materials, supplies, tools, and instructions to perform tests and indicate the presence of unreacted amines;

b. Use an identifiable, consistent, uniform, pre-packaged, factory pre-measured indicating solution;

c. Contains no mercury or lead and is environmentally friendly;

d. Contains a solution of an unreacted amine for the purpose of "self checking" the indicator solution.

2.6 ABRASIVE

Use abrasive that is specifically selected to provide a sharp, angular profile to the specified depth. Abrasive must meet all requirements of this Section each time that it is placed in the blast pot. The referenced abrasive specifications have maximum limits for soluble salts contamination; however, this maximum level of contamination does not guarantee that contamination will not be transferred to the steel surface during abrasive blasting. Other factors, such as on-site handling and recycling, can allow contamination of abrasive that can be transferred to the steel surface. Contractors are cautioned to verify that the chosen abrasive, along with work and storage processes, allow the final surface cleanliness requirements to be achieved. Successful testing of contamination in abrasive does not negate the final acceptance testing of steel surfaces.

Non-ferrous abrasives must be used for abrasive blasting stainless steel piping.

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NOTE: The following paragraph is mandatory for all PACNAVFACENGCOM projects. All other agencies may use it after checking applicability.

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[Abrasive material must contain a maximum of one percent by weight of any toxic substance listed in either Table Z-1, Z-2, or Z-3 of 29 CFR 1910-SUBPART Z, with the exception of inert or nuisance dust materials, arsenic, beryllium, cadmium, cobalt, lead, mercury, rhodium, silver, tellurium, thallium, and uranium.

] **********

NOTE: Reduce allowable gross gamma radioactivity to 5 picocuries per gram for all PACDIV projects. Reduce in other areas if states or localities require.

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[Gross gamma radioactivity must not exceed 5 picocuries per gram.

]2.6.1 Ferrous Abrasive

2.6.1.1 New and Remanufactured Steel Grit

New and remanufactured steel grit abrasive must conform to the chemical and physical properties of SSPC AB 3 Class 1 (Steel) only; Class 2 (Iron) abrasive must not be used. Modify the requirements of SSPC AB 3 to substitute the requirement in paragraph 4.2.2 CONDUCTIVITY for one chloride test as measured using the test kit described in this Section (paragraph TEST KIT FOR MEASURING CHLORIDES IN ABRASIVES). The maximum allowable chloride content is 25 parts per million (PPM).

To develop a suitable work mix from new steel abrasive, a minimum of 200 to 400 recycles is required; therefore, it may be advantageous for a Contractor to use remanufactured steel grit or grit reclaimed from a previous project. Such grit must be traced to new grit conforming to SSPC AB 3 Class 1 and it meets all cleanliness requirements of SSPC AB 3 Class 1 when brought to the current jobsite. Submit one representative sample of this work mix to the INDEPENDENT THIRD-PARTY laboratory for testing, along with samples of new material. Acceptance and use of this work mix must not be used to justify any deviation from surface preparation requirements.

2.6.1.2 Recycled Steel Grit

Recycled steel grit abrasive media must conform to the chemical and physical properties of SSPC AB 2 except that:

a. The maximum allowable chromium and cadmium content of the work mix must be 0.1 percent by weight when tested in accordance with ASTM D3718 for chromium and ASTM D3335 for cadmium. Modify the requirements of SSPC AB 2 to add requirement for one chromate test and one cadmium test for each "LEAD" test required.

b. The maximum allowable chloride content is 25 parts per million (PPM) as measured with the test kit described in paragraph TEST KIT FOR MEASURING CHLORIDES IN ABRASIVES. Modify the requirements of SSPC AB 2 to substitute requirement for one chloride test for each "WATER SOLUBLE CONTAMINANTS" test.

2.6.2 Non-Metallic Abrasive

Non-metallic abrasive must be graded to the appropriate surface profile range and must conform to the chemical and physical properties of SSPC AB 1, Class A except that:

a. The maximum allowable chromium and cadmium content of the work mix must be less than 0.1 percent by weight when tested in accordance with ASTM D3718 for chromium and ASTM D3335 for cadmium.

b. Must contain less than 7 PPM chlorides when tested with the kit provided in paragraph TEST KIT FOR MEASURING CHLORIDES IN ABRASIVES. Modify the requirements of SSPC AB 1 to substitute requirement for one chloride test for each "CONDUCTIVITY TEST" required in SSPC AB 1 (one random sample per 50 bags of abrasive or three random samples from each shipment, if abrasive is delivered in bulk).

PART 3 EXECUTION

Perform all work, rework, and repair in accordance with approved procedures in the Coatings Work Plan. The Coatings Work Plan must be submitted and approved by the PCS prior to mobilization in accordance with the paragraph entitled COATINGS WORK PLAN.

3.1 FIELD SAMPLE COLLECTION AND TESTING

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NOTE: For shop applied coatings, only the QC Manager and either the PCS or the Quality Assurance Coatings Inspector must witness sampling. For field applied coatings, the QC Manager and either the PCS or the Quality Assurance Coatings Inspector must witness sampling.

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Sample and test materials delivered to the jobsite as required in the subsequent subparagraphs. Notify Contracting Officer three days in advance of sampling. The QC Manager, and either the PCS or the Quality Assurance Coatings Inspector, must witness all sampling.

3.1.1 Coating Field Sample Collection

All coatings/resins applied in the shop and in the field require one sample to be collected from each coating type used. This sample must be collected and set aside for the duration of the project, and must be tested if unforeseen coatings issues arise or if testing is requested by the Contracting Officer.

Field applied coatings require a random field sample from each lot of coating material used on-site in accordance with ASTM D3925. Each random sample must be tested. Utilize sample collection kits as outlined in the paragraph entitled COATING FIELD SAMPLE COLLECTION AND SHIPPING KIT. For powder based coatings, collect a one liter quart sample from each lot by random selection. For two component liquid coatings, obtain a one liter quart sample of each base material, and proportional samples of each activator based on mix ratio, by random selection from sealed containers from each lot. Prior to sampling, mix contents of each sealed container to ensure uniformity. As an alternative to collecting small samples from kits, entire kits may be randomly selected and shipped to the THIRD-PARTY INDEPENDENT laboratory, observing all requirements for witnessing and traceability. For purposes of quality conformance inspection, a lot is defined as that quantity of materials from a single, uniform batch produced and offered for delivery at one time. A batch is defined as that quantity of material processed by the manufacturer at one time and identified by number on the label. Identify samples by designated name, specification number, batch number, project contract number, sample date, intended use, and quantity involved. The QC manager will take possession of the packaged samples, contact the shipping company to arrange for pickup, and ship one complete sample of each material in question

(including powder or base and activator) with all batch information to the INDEPENDENT THIRD-PARTY laboratory for testing as required in paragraph COATING FIELD TESTING REPORTS.

3.1.2 Abrasive Field Sample Collection

Utilize the sample collection kits as required in paragraph ABRASIVE FIELD SAMPLE COLLECTION AND SHIPPING KIT to obtain samples from each lot of abrasive delivered to site using the sampling techniques and schedule of one sample per every 50 bags for ferrous metallic abrasive, paragraph 4 REQUIREMENTS FOR RECYCLED WORK MIX ABRASIVES of SSPC AB 2 for recycled ferrous metallic abrasives, or paragraph 5.3 SAMPLING FOR QUALITY CONTROL TESTS of SSPC AB 1 for non-metallic abrasives.

For purposes of quality conformance inspection, a lot must consist of all abrasive materials of the same type from a single, uniform batch produced and offered for delivery at one time. The addition of any substance to a batch must constitute a new lot. Identify samples by designated name, specification number, lot number, project contract number, sample date, intended use, and quantity involved. The QC manager will take possession of the packaged samples, contact the shipping company to arrange for pickup, and relinquish the samples only to the shipping representative for shipment to the approved INDEPENDENT THIRD-PARTY laboratory for testing required in paragraph ABRASIVE SAMPLE TEST REPORTS.

3.1.3 Coating Field Test Reports

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NOTE: Delete the bracketed coating systems that will not be used for this project.

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Submit test results for each sample that requires testing in the paragraph COATINGS FIELD SAMPLE COLLECTION. Test samples of coating material for compliance with requirements of [AWWA C203][AWWA C209][AWWA C210][AWWA C216][AWWA C217][NACE RP0402]. Reject entire batch represented by samples that fail one or more tests, select new lots, and test samples.

3.1.4 Abrasive Field Test Reports

Submit test results for each lot of abrasive delivered to the jobsite. Test samples of ferrous metallic abrasive to the requirements of paragraph 5.2 TEST PARAMETERS of SSPC AB 3, excluding paragraph 5.2.4 DURABILITY. Test samples of recycled ferrous metallic abrasives to the requirements of paragraph 4 REQUIREMENTS FOR RECYCLED WORK MIX ABRASIVES of SSPC AB 2. Test samples of non-metallic abrasive to the requirements of paragraph 5.3 SAMPLING FOR QUALITY CONTROL TESTS of SSPC AB 1. Reject entire lot represented by samples that fail one or more tests, select new lots, and test samples.

3.2 LIGHTING

Provide lighting for all work areas as prescribed in SSPC Guide 12.

3.3 ENVIRONMENTAL CONDITIONS

3.3.1 Automated Monitoring Requirements for Shop Applied Coating

Provide continuous monitoring of temperature, relative humidity, and dew

point data at pertinent points in the shop, during surface preparation, coating application, and initial cure. This data does not suffice for documentation of conformity to surface conditions during application and cure of coating. Locate sensors to provide pertinent data for the surface preparation and coating application being performed, as well as the temperature extremes on the structure. Describe the location plan in the Coatings Work Plan. Monitor any heating, cooling, or dehumidification equipment used. Provide monitoring equipment to perform as follows:

a. Data is collected in 15-minute increments, and available for download (on-site) in a standard database format. Contractor must collect these data and make available to the Contracting Officer and QC Manager;

b. Monitoring equipment must have backup power such that data collection will be uninterrupted during the entire period of the dehumidification requirement;

c. Monitoring equipment must have capability to measure interior and exterior dry bulb temperature (DB), relative humidity (RH), and dewpoint temperature (DP).

There is no requirement for connectivity of the monitoring system to control the dehumidification equipment; therefore, any combination of equipment having the required functionality will be accepted.

3.3.2 Containment for Field Coating

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NOTE: Experience has shown that containment provides cost-effective control of environmental conditions, and the better conditions result in a better coating product.

SSPC Guide 6, has four classes of containment, from Class 1 being the highest level of control. Generally, Classes 1 and 2 are only required for removal of hazardous materials, while Class 3 is probably satisfactory for most coating operations. Class 4 requires minimal "knockdown" of airborne debris, and is not generally usable as an airborne particulate control measure.

****

Design and provide a containment system for the capture, containment, collection, storage, and disposal of the waste materials generated by the work under this Section, to meet the requirements of SSPC Guide 6, Class [1][2][3]. Vapor concentrations must be kept at or below 10 percent of Lower Explosive Limit (LEL) at all times. Containment may be designed as fixed containment for complete structure or portable containment for sections of structure; however, containment must remain in any one place from beginning of abrasive blasting through initial cure of coating. Waste materials covered by this paragraph must not include any material or residue from removal of coatings containing lead, chromium, cadmium, PCB, or any other hazardous material.

It is the Contractors responsibility to insure the feasibility and workability of the containment system. The Contractor must perform their operations and work schedule in a manner as to minimize leakage of the containment system. The containment system must be properly maintained

and must not deviate from the approved drawings. If the containment system fails to function satisfactorily, the Contractor must suspend all operations, except those required to minimize adverse impact on the environment or government property. Operations must not resume until modifications have been made to correct the cause of the failure.

3.3.3 Automated Monitoring Requirements for Field Coating

Provide continuous monitoring of temperature, relative humidity, and dew point data at pertinent points on the structure, during surface preparation, coating application, and initial cure. This data does not suffice for documentation of conformity to surface conditions during application and cure of coating. Locate sensors to provide pertinent data for the surface preparation and coating application being performed, as well as the temperature extremes on the structure. Describe the location plan, including required moves, in the Coatings Work Plan. Monitor any heating, cooling, or dehumidification equipment used. Provide monitoring equipment to perform as follows:

a. Data is collected in the field unit in 15-minute increments, and available for download (on-site) in a standard database format. Contractor must collect these data and make available to the Contracting Officer, Quality Assurance Coatings Inspector, and QC Manager;

b. Monitoring equipment must have backup power such that data collection will be uninterrupted during the entire period of the dehumidification requirement;

c. Monitoring equipment must have capability to measure surface temperatures at a minimum of four locations anywhere on a structure, regardless of the size of the structure;

d. Monitoring equipment must have capability to measure interior and exterior dry bulb temperature (DB), relative humidity (RH), and dewpoint temperature (DP).

There is no requirement for connectivity of the monitoring system to control the dehumidification equipment; therefore, any combination of equipment having the required functionality will be accepted.

3.4 SHOP APPLIED COATING OF BURIED PIPING

3.4.1 Surface Preparation for Shop Applied Coating

Prepare exterior steel surfaces in accordance with [AWWA C210][AWWA C213][AWWA C215].

3.4.1.1 Abrasive Blasting Equipment for Shop Applied Coating of Buried Piping

Confirm that air supply for abrasive blasting is free of oil and moisture when tested in accordance with ASTM D4285. Test air quality at each startup, but in no case, less often than every five operating hours.

3.4.1.2 Contamination Evaluation of Abrasive for Shop Applied Coating of Buried Piping

Test abrasive for salt contamination and oil contamination as required

SSPC AB 1 for non-metallic abrasives, SSPC AB 2 for recycled ferrous abrasives, and SSPC AB 3 for ferrous metallic abrasives. Modify the schedule of testing to be daily, at startup, and every five operating hours thereafter.

3.4.1.3 Pre-Preparation Testing for Surface Contamination for Shop Applied Coating of Buried Piping

3.4.1.3.1 Pre-Preparation Testing for Oil and Grease Contamination for Shop Applied Coating of Buried Piping

Inspect all surfaces for oil or grease contamination using two or more of the following inspection techniques:

1) VISUAL INSPECTION - Observe surface for evidence of dirt or oil.

2) WATER BREAK TEST - Spray atomized mist of distilled water onto surface and observe for water beading. If water wets surface rather than beading up, surface can be considered free of oil or grease contamination. Beading of water (water forms droplets) is evidence of oil or grease contamination.

3) CLOTH RUB TEST - Rub a clean, white, lint-free, cotton cloth onto surface and observe for discoloration. To confirm oil or grease contamination in lightly stained areas, a non-staining solvent may be used to aid in oil or grease extraction. Any visible discoloration is evidence of oil or grease contamination.

Reject oil or grease contaminated surfaces, clean [using a water based pH neutral degreaser]in accordance with SSPC SP 1, and recheck for contamination until surfaces are free of oil and grease.

3.4.1.3.2 Pre-Preparation Testing for Soluble Salts Contamination for Shop Applied Coating of Buried Piping

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NOTE: The testing for chlorides, sulfates, and nitrates (CSN) is especially important if there was evidence of corrosion production or if the bare surface has been contaminated prior to surface preparation.

****

Test each lot of pipe for soluble salt contamination on the [internal and external]surfaces using the test kit described in paragraph TEST KIT FOR MEASURING CHLORIDE, SULFATE, AND NITRATE IONS ON STEEL AND COATED SURFACES. For pipes with an outer diameter (OD) of less than 2.54 centimeters 6 inches, one test per 6.09 meters 20 lineal feet is required. For pipes with an OD of more than 2.54 centimeters 6 inches, three tests per 9.29 square meters 100 square feet must be taken, with a minimum of one test per section of pipe. Label all test tubes and retain for test verification. Reject and wash surfaces of the entire lot if one or more readings greater than 3 micrograms per square centimeter of chlorides or 10 micrograms per square centimeter of sulfates or 5 micrograms per square centimeter of nitrates is measured.

Effective washing and removal of soluble salts will require removal of any barrier to the steel surface, including rust or mill scale. This procedure may necessitate combinations of wet abrasive blasting, high

pressure water rinsing, and cleaning using a solution of water and soluble salt remover. The soluble salt remover must be acidic, biodegradable, non-toxic, non-corrosive, and after application, will not interfere with primer adhesion. Use potable water, or potable water modified with soluble salt remover, for all washing or wet abrasive blasting.[Additional testing is required when there are delays between testing and preparation or testing and coating application.] Test methods and equipment used in this phase must be included in the Coatings Work Plan.

This phase is required because pre-preparation testing and washing are generally more advantageous than attempting to remove soluble salt contamination after abrasive blasting. Soluble salt testing is also required in paragraph PRE-APPLICATION TESTING FOR SOLUBLE SALTS CONTAMINATION as a final acceptance test of prepared surfaces after abrasive blasting. Successful completion of pre-preparation testing and washing does not negate the requirement for pre-application testing.

3.4.1.4 Abrasive Blasting External Surfaces for Shop Applied Coating of Buried Piping

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NOTE: Select bracketed coating system consistent with the external coating system selected in SHOP-APPLIED COATING FOR BURIED PIPING.
****

[For carbon steel, prepare surfaces in accordance with SSPC SP 10/NACE No. 2.][For stainless steel, prepare surfaces in accordance with SSPC SP 17. The surface profile must be in accordance with the coating manufacturer's recommended range. Non-ferrous abrasives must be used.]The surface profile must be in accordance with [AWWA C210][AWWA C213][AWWA C215] and measured in accordance with ASTM D4417, Method A and Method C. The appearance of the surface after blasting must have the appearance of a Sand or Grit comparator. A rounded profile shape or peened surface is not acceptable. Measure profile at a rate of three measurements per lot at the beginning of the day.

[3.4.1.5 Abrasive Blasting Internal Surfaces for Shop Applied Coating of Buried Piping

For carbon steel, prepare surfaces in accordance with SSPC SP 10/NACE No. 2. The surface profile must be in accordance with the coating manufacturer's recommended range. Measure surface profile in accordance with ASTM D4417, Method A and Method C. The appearance of the surface after blasting must have the appearance of a Sand or Grit comparator. A rounded profile shape or peened surface is not acceptable. For pipes with an outer diameter (OD) of less than 2.54 centimeters 6 inches, one test per 6.09 meters 20 lineal feet is required. For pipes with an OD of more than 2.54 centimeters 6 inches, three tests per 9.29 square meters 100 square feet must be taken, with a minimum of one test per section of pipe. Internal lining must not be used for stainless steel piping.

]3.4.1.6 Disposal of Used Abrasive for Shop Applied Coating of Buried Piping

Provide Disposal of Used Abrasive Shop Applied Coating, in accordance with Federal, State, and Local mandated regulations.

3.4.1.7 Pre-Application Testing for Surface Contamination for Shop Applied Coating of Buried Piping

3.4.1.7.1 Pre-Application Testing for Oil and Grease Contamination for Shop Applied Coating of Buried Piping

Ensure surfaces are free of contamination as described in paragraph PRE-PREPARATION TESTING FOR OIL AND GREASE CONTAMINATION FOR SHOP APPLIED COATING OF BURIED PIPING, except that only questionable areas need be checked for beading of water misted onto surface.

3.4.1.7.2 Pre-Application Testing for Surface Cleanliness for Shop Applied Coating of Buried Piping

Apply coatings to dust free surfaces. To test surfaces, use ISO 8502-3. Use a kit that is compliant with ISO 8502-3. A rating of 2 or better must be achieved for acceptance. If a test does not result in a rating of 2 or better, reject contaminated surfaces, clean by vacuum cleaning, and retest. Test surfaces at rate of one test per joint or repair area where application will be performed. Provide two additional tests for each failed test or questionable test. Document test results in the Daily Inspection Report and attach tape to the Inspection Logbook.

Ferrous abrasives may become magnetized and difficult to remove from the steel substrate. If ferrous abrasives are used, additional visual inspection must be performed to ensure no surface contamination by the abrasive is present.

3.4.2 Mixing and Application of Shop Applied Coating of Buried Piping

[3.4.2.1 Mixing Liquid Epoxy Coatings

Mix materials as stated in coating system instructions. Mix materials in same temperature and humidity conditions specified in paragraph DELIVERY AND STORAGE. Allow mixed material to stand for the required induction time.

Apply mixed products within stated pot life for each product. Stop applying when material becomes difficult to apply in a smooth, uniform wet film. Do not add solvent to extend pot life. Add all required solvent, if allowable by the coating manufacturer, at time of mixing.

]3.4.2.2 External Pipe Shop Applied Coating Application

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NOTE: Select bracketed coating system consistent with the external coating system selected in SHOP-APPLIED COATING FOR BURIED PIPING.
****

Apply coatings in accordance with SSPC PA 1 and as specified in [AWWA C210][AWWA C213][AWWA C215]. Apply coatings to surfaces that meet all stated surface preparation requirements.

[For the application of AWWA C210, the dry film thickness (DFT) must be a minimum of 400 microns 16 mils. The coating thickness must not exceed the manufacturers recommendations.

][For the application of AWWA C213, the DFT must be a minimum of 300 microns

12 mils. The coating thickness must not exceed the manufacturers recommendations.

][For the application of AWWA C215, the total coating thickness must be a minimum of as shown in the below table:

Pipe Diameter (mm)	Adhesive (mm)	Polyolefin (mm)	Total Thickness (mm)
0 to 50	0.20	0.56	0.76
75 to 150	0.20	0.76	0.96
200 to 400	0.20	0.92	1.12
450 to 900	0.20	1.02	1.22
Greater than 950	0.20	1.52	1.72

Pipe Diameter (in)	Adhesive (mils)	Polyolefin (mils)	Total Thickness (mils)
0 to 2	8	22	30
3 to 6	8	30	38
8 to 16	8	36	44
18 to 36	8	40	48
Greater than 38	8	60	68

The coating thickness must not exceed the manufacturers recommendations.

][3.4.2.3 Internal Pipe Coating Application

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NOTE: Select bracketed coating system consistent with the internal coating system selected in SHOP-APPLIED COATING FOR BURIED PIPING.
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NOTE: Internal coatings must not be used with stainless steel piping.
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[For AWWA C213, apply coatings in accordance with SSPC PA 1 and as specified in AWWA C213.][For MPI 500 and MPI 501, apply coating in accordance with SSPC PA 1 and as directed by the coating manufacturer.]Apply coatings to surfaces that meet all stated surface preparation requirements.

[For the application of AWWA C213, the DFT must be a minimum of 300 microns 12 mils. The coating thickness must not exceed the manufacturers recommendations.

][For the application of MPI 500 and MPI 501, the coatings must be applied at the DFT specified in the coating system instructions.

]]3.4.2.4 Holiday Testing and Shop Repair

****
NOTE: Select bracketed coating system consistent with the coating system selected in SHOP-APPLIED COATING FOR BURIED PIPING.
****

Perform holiday testing on all shop-applied, externally coated areas and repair as outlined in [AWWA C210][AWWA C213][AWWA C215].

3.5 FIELD EXTERIOR COATING OF ABOVEGROUND PIPING

Coat aboveground, carbon steel piping in accordance with Section 09 97 13.27 HIGH PERFORMANCE COATING FOR STEEL STRUCTURES.

3.6 FIELD REPAIRS TO EXTERNAL COATING OF BURIED PIPING

Field repairs must only be performed when repairing shop applied coatings in the field and coating external girth welds.

3.6.1 Surface Preparation for Field Coating of Buried Piping

Block or suspended pipeline at a height that will allow the blast nozzle to be perpendicular to the surface being blasted, and at the proper standoff distance, at all times.

3.6.1.1 Abrasive Blasting Equipment for Field Coating of Buried Piping

Use abrasive blasting equipment of conventional air, force-feed, or pressure type. Maintain a minimum pressure of 650 kPa 95 psig at nozzle. Confirm that air supply for abrasive blasting is free of oil and moisture when tested in accordance with ASTM D4285. Test air quality at each startup, but in no case, less often than every five operating hours.

3.6.1.2 Contamination Evaluation of Abrasive for Field Coating of Buried Piping

Test abrasive for salt contamination and oil contamination as required SSPC AB 1 for non-ferrous abrasives, SSPC AB 2 for recycled ferrous abrasives, and SSPC AB 3 for ferrous abrasives. Modify the schedule of testing to be daily, at startup, and every five operating hours thereafter.

3.6.1.3 Surface Standard

Inspect surfaces to be coated, and select plate with similar properties and surface characteristics for use as a surface standard. Blast clean one or more 300 mm one foot square steel panels in the manner specified in paragraph ABRASIVE BLASTING FOR FIELD COATING OF BURIED PIPING. Record blast nozzle type and size, air pressure at nozzle and compressor, distance of nozzle from panel, and angle of blast to establish procedures for blast cleaning. Measure surface profile in accordance with ASTM D4417, Method C. When the surface standard complies with all specified requirements, seal with a clearcoat protectant. Use the surface standard for comparison to abrasive blasted surfaces throughout the course of work.

3.6.1.4 Pre-Preparation Testing for Surface Contamination for Field Coating of Buried Piping

3.6.1.4.1 Pre-Preparation Testing for Oil and Grease Contamination for Field Coating of Buried Piping

Inspect all surfaces for oil or grease contamination using two or more of the following inspection techniques:

1) VISUAL INSPECTION - Observe surface for evidence of dirt or oil.

2) WATER BREAK TEST - Spray atomized mist of distilled water onto surface and observe for water beading. If water wets surface rather than beading up, surface can be considered free of oil or grease contamination. Beading of water (water forms droplets) is evidence of oil or grease contamination.

3) CLOTH RUB TEST - Rub a clean, white, lint-free, cotton cloth onto surface and observe for discoloration. To confirm oil or grease contamination in lightly stained areas, a non-staining solvent may be used to aid in oil or grease extraction. Any visible discoloration is evidence of oil or grease contamination.

Reject oil or grease contaminated surfaces, clean using a water based pH neutral degreaser in accordance with SSPC SP 1, and recheck for contamination until surfaces are free of oil and grease.

3.6.1.4.2 Pre-Preparation Testing for Soluble Salts Contamination for Field Coating of Buried Piping

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NOTE: The testing for chlorides, sulfates, and nitrates (CSN) is especially important if there was evidence of corrosion production or if the bare surface has been contaminated prior to surface preparation.

****

Prior to abrasive blasting, test all exposed girth welds and areas to be recoated for soluble salt contamination using the test kit described in paragraph TEST KIT FOR MEASURING CHLORIDE, SULFATE, AND NITRATE IONS ON STEEL AND COATED SURFACES. Label all test tubes and retain for test verification. Reject and wash surfaces if one or more readings greater than 3 micrograms per square centimeter of chlorides or 10 micrograms per square centimeter of sulfates or 5 micrograms per square centimeter of nitrates is measured.

Effective washing and removal of soluble salts will require removal of any barrier to the steel surface, including rust. This procedure may necessitate combinations of wet abrasive blasting, high pressure water rinsing, and cleaning using a solution of water and soluble salts remover. The soluble salts remover must be acidic, biodegradable, non-toxic, non-corrosive, and after application, will not interfere with coating adhesion. Delays between testing and preparation, or testing and coating application, may allow for the formation of new contamination. Use potable water, or potable water modified with soluble salt remover, for all washing or wet abrasive blasting. Test methods and equipment used in this phase must be included in the Coatings Work Plan.

This phase is required because pre-preparation testing and washing are generally more advantageous than attempting to remove soluble salt contamination after abrasive blasting. Soluble salt testing is also required in paragraph PRE-APPLICATION TESTING FOR SOLUBLE SALTS CONTAMINATION FOR FIELD COATING OF BURIED PIPING as a final acceptance test of prepared surfaces after abrasive blasting. Successful completion of pre-preparation testing and washing does not negate the requirement for pre-application testing.

3.6.1.5 Abrasive Blasting for Field Coating of Buried Piping

[For carbon steel, prepare girth welds and repairs to bare steel to SSPC SP 10/NACE No. 2 immediately prior to coating application. Verify that prepared surfaces comply with SSPC VIS 1 and match the prepared test-panels from the paragraph SURFACE STANDARD at the time of coating application. The surface profile must be in accordance with the coating manufacturer's recommended range. Measure the surface profile in accordance with ASTM D4417, Method A and Method C. The appearance of the surface after blasting must have the appearance of a Sand or Grit comparator. A rounded profile shape or peened surface is not acceptable. For pipes with an outer diameter (OD) of less than 2.54 centimeters 6 inches, one test per 6.09 meters 20 lineal feet is required. For pipes with an OD of more than 2.54 centimeters 6 inches, three tests per 9.29 square meters 100 square feet must be taken, with a minimum of one test per section of pipe. Internal lining must not be used for stainless steel piping. When surfaces are re-blasted for any reason, retest profile as specified. Following abrasive blasting, remove dust and debris by vacuum cleaning. Dust and debris tend to collect at welds, plate overlaps, and surface irregularities. Do not attempt to wipe surface clean.][For stainless steel, prepare girth welds and repairs to bare steel to SSPC SP 17 immediately prior to coating application. Verify that prepared surfaces comply with SSPC VIS 1 at time of coating application. All other surfaces must be prepared in accordance with the appropriate coating standard referenced herein. The surface profile must be in accordance with the coating manufacturer's recommended range. Measure the surface profile in accordance with ASTM D4417, Method A and Method C. The appearance of the surface after blasting must have the appearance of a Sand or Grit comparator. A rounded profile shape or peened surface is not acceptable. For pipes with an outer diameter (OD) of less than 2.54 centimeters6 inches, one test per 6.09 meters 20 lineal feet is required. For pipes with an OD of more than 2.54 centimeters 6 inches, three tests per 9.29 square meters 100 square feet must be taken, with a minimum of one test per section of pipe. Internal lining must not be used for stainless steel piping. Non-ferrous abrasive must be used. When surfaces are re-blasted for any reason, retest profile as specified. Following abrasive blasting, remove dust and debris by vacuum cleaning. Dust and debris tend to collect at welds, plate overlaps, and surface irregularities. Do not attempt to wipe surface clean.]

3.6.1.6 Disposal of Used Abrasive for Field Coating of Buried Piping

Provide Disposal of Used Abrasive Field Applied Coating off Government property in accordance with Federal, State, and Local mandated regulations.

3.6.1.7 Pre-Application Testing for Surface Contamination for Field Coating of Buried Piping

3.6.1.7.1 Pre-Application Testing for Oil and Grease Contamination for Field Coating of Buried Piping

Ensure surfaces are free of contamination as described in paragraph PRE-PREPARATION TESTING FOR OIL AND GREASE CONTAMINATION FOR FIELD COATING OF BURIED PIPING, except that only questionable areas need to be checked for beading of water misted onto surface.

3.6.1.7.2 Pre-Application Testing for Soluble Salts Contamination for Field Coating of Buried Piping

****

NOTE: The testing for chlorides, sulfates, and nitrates (CSN) is especially important if there was evidence of corrosion production or if the bare surface has been contaminated prior to coating application.

****

Test surfaces for soluble salts using the test kit described in paragraph TEST KIT FOR MEASURING CHLORIDE, SULFATE, AND NITRATE IONS ON STEEL AND COATED SURFACES, test girth welds and areas to be recoated for soluble salts. Label all test tubes and retain for test verification. One or more readings greater than 3 micrograms per square centimeter of chlorides or 10 micrograms per square centimeter of sulfates or 5 micrograms per square centimeter of nitrates is evidence of soluble salt contamination. Reject contaminated surfaces, wash as required in paragraph PRE-PREPARATION TESTING FOR SOLUBLE SALTS CONTAMINATION FOR FIELD COATING OF BURIED PIPING, allow to dry, and re-test, and re-wash until all required tests show allowable results. Re-blast tested areas using vacuum equipped blast equipment.

3.6.1.7.3 Pre-Application Testing for Surface Cleanliness for Field Coating of Buried Piping

Apply coatings to dust free surfaces. To test surfaces, use ISO 8502-3. Use a kit that is compliant with ISO 8502-3. A rating of 2 or better must be achieved for acceptance. If a test does not result in a rating of 2 or better, reject contaminated surfaces, clean by vacuum cleaning, and retest. Test surfaces at rate of one test per joint or repair area where application will be performed. Provide two additional tests for each failed test or questionable test. Document test results in the Daily Inspection Reports and attach tape to the Inspection Logbook.

Ferrous abrasives may become magnetized and difficult to remove from the steel substrate. If ferrous abrasives are used, additional visual inspection must be performed to ensure no surface contamination by the abrasive is present.

3.6.2 Coating Mixing and Application for Field Coating of Buried Piping

3.6.2.1 Mixing Coating Materials for Field Coating of Buried Piping

a. Mix and apply coating materials in accordance with the approved coating system instructions, which may differ for each product. Do not mix partial kits unless standardized measuring cups are utilized.

Do not alter mix ratios. Mix materials in same temperature and humidity conditions specified in paragraph DELIVERY AND STORAGE. Allow mixed material to stand for the required induction time. All mixing processes must be witnessed by the Quality Assurance Coatings Inspector.

b. Apply mixed products within stated pot life for each product. Stop applying when material becomes difficult to apply in a smooth, uniform wet film. Do not add solvent to extend pot life. Add all required solvent at time of mixing, as allowable per the coating system instructions.

c. If coating materials are not liquid materials (i.e., powder or extrusion materials), this paragraph may not apply. Follow the recommended instructions per the approved coating system instructions.

3.6.2.2 Application Conditions and Recoat Windows for Field Coating of Buried Piping

The application condition requirements for coatings are time and temperature sensitive. Plan coating application to ensure that specified temperature, humidity, and condensation conditions are met. If conditions do not allow for proper application of the coating materials, use appropriate means of controlling air and surface temperatures, as required. Partial or total enclosures, insulation, heating, cooling, or other appropriate measures may be required to control conditions to allow for orderly application of all required coats.

Maintain air and steel surface temperature within the range allowable by the approved coating system instructions during application and initial cure. Maintain steel surface temperature more than 3 degrees C 5 degrees F above the dew-point of the ambient air for the same period. These conditions may require environmental controls through containment.

3.6.2.3 Coating Application for Field Coating of Buried Piping

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NOTE: Select bracketed coating system consistent with the coating system selected in FIELD-APPLIED EXTERNAL PIPE COATING.

****

Apply coatings in accordance with SSPC PA 1 and as specified in [AWWA C203][AWWA C209][AWWA C210][AWWA C216][AWWA C217][NACE RP0402]. Apply coatings to surfaces that meet all stated surface preparation requirements.

3.6.2.4 Holiday Testing and Field Repair

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NOTE: Select bracketed coating system consistent with the coating system selected in FIELD-APPLIED EXTERNAL PIPE COATING.

****

Perform holiday testing on all field coated areas and repair as outlined in [AWWA C203][AWWA C209][AWWA C210][AWWA C216][AWWA C217][NACE RP0402].

3.6.3 Final Inspection of Pipeline Prior to Burial

Verify that all surfaces of the pipeline are holiday-free at time of placement of backfill over pipe. Use holiday inspection requirements and acceptance criteria of the standards applicable to the coatings being tested.

3.6.4 Final Cleanup

Following completion of the work, remove debris, equipment, and materials from the site. Remove all foreign matter such as blast media, dust, dirt, debris, grease, and oils. Wipe all dry to handle coated surfaces with damp lint-free cloth. Remove temporary connections to Government- or Contractor-furnished water and electrical services. Restore existing facilities in and around the work areas to their original condition.

3.7 FIELD AND SHOP QUALITY CONTROL

For marking of surfaces, use chalk for marking bare steel and water based markers for marking coated surfaces. Remove marks prior to coating. Do not use any wax or grease based markers, or any other markers that leave a residue or stain.

3.7.1 Inspection

3.7.1.1 Inspection Requirements

a. Perform inspections in accordance with ASTM D3276 and the approved Coatings Work Plan.

b. Provide all tools and instruments required to perform the required testing, as well as any tools or instruments that the inspector considers necessary to perform the required inspections and tests. Document each inspection and test, including required hold points and other required inspections and tests, as well as those inspections and tests deemed prudent from on-site evaluation to document a particular process or condition, as follows:

   (1) Location or area;

   (2) Purpose (required or special);

   (3) Method;

   (4) Criteria for evaluation;

   (5) Results;

   (6) Determination of compliance;

   (7) List of required rework;

   (8) Observations.

c. Collect and record environmental conditions as described in ASTM D3276 on a 24 hour basis, as follows:

   (1) During surface preparation, every hour, or when changes occur;

(2) During coating application and the first four days of initial cure, every hour, or when changes occur;

(3) Note location, time, and temperature of the highest and lowest surface temperatures each day;

(4) Use a non-contact thermometer to locate temperature extremes, then verify with contact thermometers.

d. Data collected on environmental conditions in AUTOMATED MONITORING REQUIREMENTS may be used for overnight data; however, the data must be constantly verified as to location of sensors and validity of data with respect to the coating work being accomplished.

e. Document all equipment used in inspections and testing, including manufacturer, model number, serial number, last calibration date and future calibration date, and results of on-site calibration performed. Work documented using data from equipment found to be out of calibration must be considered as non-compliant since last calibration or calibration check, as required.

f. Document Contractors compliance with the Coatings Work Plan.

3.7.1.2 Inspection Report Forms

Develop project-specific report forms as required to report measurements, test results, and observations being complete and conforming to contract requirements. This includes all direct requirements of the contract documents and indirect requirements of referenced documents. Show acceptance criteria with each requirement and indication of conformity of each inspected item. The data may be in any format, but must be legible and presented so that entered data can be quickly compared to the appropriate requirement.

3.7.1.3 Daily Inspection Reports

Submit one copy of daily inspection report completed each day when performing work under this Section, to the Contracting Officer. Note all non-compliance issues, and all issues that were reported for rework in accordance with QC procedures of Section 01 45 00 QUALITY CONTROL. Each report must be signed by the Quality Assurance Coatings Inspector and the QC Manager. Submit report within 24 hours of date recorded on the report.

3.7.1.4 Inspection Logbook

A continuous record of all activity related to this Section must be maintained in an Inspection Logbook on a daily basis. The logbook must be hard or spiral-bound book or digital program with consecutively numbered pages, and must be used to record all information provided in the Daily Inspection Reports, as well as other pertinent observations and information. Submit the original Inspection Logbook to the Contracting Officer upon completion of the project and prior to final payment.

3.7.1.5 Inspection Equipment

All equipment must be in good condition, operational within its design range, and calibrated as required by the specified standard for use of each device.

3.7.2 Coatings Contractor QC Coatings Inspector's Responsibilities

The Coatings Contractor QC Coatings Inspector responsibilities include complete documentation of all daily inspection and production activities for the entire coatings project as outlined in the Coatings Work Plan, scope of work (SOW) project program, and this Section. This includes, but is not limited to, the following:

a. Attending and documenting the pre-job meeting and acquiring the scope of work (SOW) project program, inspection and testing plan (ITP), schedule, and a list of who will receive the QC daily inspection reports;

b. Performing a project site walk-through with the Quality Assurance Evaluator (QAE) or asset owner, Coatings Contractor QC, QC Manager, and Quality Assurance Coatings Inspector, inspecting at least the following:

   (1) Asset(s) to be coated;

   (2) Equipment and placement of equipment;

   (3) Materials delivery and storage;

   (4) Facility operational requirements during the project.

c. Perform all daily and hold point inspections including, but not limited to, the following:

   (1) Check equipment, including blotter test to verify compressed air cleanliness;

   (2) Perform non-visible contaminants testing (in accordance with PRE-PREPARATION TESTING FOR SOLUBLE SALT CONTAMINATION FOR SHOP APPLIED COATING OF BURIED PIPING, PRE-APPLICATION TESTING FOR SOLUBLE SALT CONTAMINATION FOR SHOP APPLIED COATING OF BURIED PIPING, PRE-PREPARATION TESTING FOR SOLUBLE SALT CONTAMINATION FOR FIELD COATING OF BURIED PIPING, and PRE-APPLICATION TESTING FOR SOLUBLE SALT CONTAMINATION FOR FIELD COATING OF BURIED PIPING);

   (3) Perform visible contaminants testing (in accordance with PRE-PREPARATION TESTING FOR OIL AND GREASE CONTAMINATION FOR SHOP APPLIED COATING OF BURIED PIPING, PRE-APPLICATION TESTING FOR OIL AND GREASE CONTAMINATION FOR SHOP APPLIED COATING OF BURIED PIPING, PRE-PREPARATION TESTING FOR OIL AND GREASE CONTAMINATION FOR FIELD COATING OF BURIED PIPING, and PRE-APPLICATION TESTING FOR OIL AND GREASE CONTAMINATION FOR FIELD COATING OF BURIED PIPING);

   (4) Obtain environmental readings;

   (5) Perform abrasive testing per SSPC AB 1, SSPC AB 2, or SSPC AB 3;

   (6) Perform surface preparation monitoring and testing;

   (7) Perform surface cleanliness testing;

   (8) Perform dust quantity testing;

(9) Record materials storage documentation (record all coatings and abrasive materials information, batch numbers, segregation, and storage temperature);

(10) Witness all coatings materials mixing and record mix materials temperatures, with verification of time of coatings pot life;

(11) Verify, witness, and record application method;

(12) Perform random wet film thickness (WFT) readings;

(13) Perform inspection of coatings application;

(14) Obtain dry film thickness (DFT) readings per SSPC PA 2;

(15) Perform holiday testing in accordance with HOLIDAY TESTING AND SHOP REPAIR and HOLIDAY TESTING AND FIELD REPAIR;

(16) Label asset identification (label stickers);

(17) Write Correction Action Reports (CAR), if needed;

(18) Write Non-Conformance Reports (NCR), if needed.

d. Writing a daily detailed summary of the work shift inspections, testing, and the day's events, including any meetings and prevalent conversations. The final daily report must include a project summary that must be part of the daily coatings inspection report.

e. The Coatings Contractor QC Coatings Inspector must stop all non-compliant work.

3.7.3 Quality Assurance Coatings Inspector's Responsibilities

The Quality Assurance Coatings Inspector's responsibilities include complete documentation of all on-site work associated with the coatings project. These responsibilities include, but are not limited to, the following:

a. Attending and documenting the pre-job meeting and acquiring the scope of work (SOW) project program, inspection and testing plan (ITP), schedule, and a list of who will receive the QC daily inspection reports;

b. Performing a project site walk-through with the Quality Assurance Evaluator (QAE) or asset owner, prime Contractor, and coatings Contractor (QC Coatings Inspector and QC Manager), inspecting at least the following:

(1) Asset(s) to be coated;

(2) Equipment and placement of equipment;

(3) Materials delivery and storage;

(4) Facility operational requirements during the project.

c. Verifying all daily and hold point inspections performed by the Coatings Contractor QC Coatings Inspector or QC Manager by performing

mirror inspections including, but not limited to, the following:

(1) Verify equipment check, including blotter test to verify compressed air cleanliness;

(2) Verify visible contaminants testing;

(3) Take environmental readings;

(4) Perform surface preparation monitoring and testing;

(5) Perform surface cleanliness testing;

(6) Perform dust quantity test;

(7) Record materials storage documentation (record all coating and abrasive information, batch numbers, segregation, and storage temperature);

(8) Witness all coatings materials mixing and record mix materials temperatures, with verification of time of coatings pot life;

(9) Verify, witness, and record application method;

(10) Inspect coatings application;

(11) Perform dry film thickness (DFT) readings per SSPC PA 2;

(12) Inspect asset identification (label stickers);

(13) Write Correction Action Reports (CAR), if needed;

(14) Write Non-Conformance Reports (NCR), if needed.

d. The following testing is witnessed by the Quality Assurance Coatings Inspector and performed by the Coatings Contractor QC Coatings Inspector or QC Manager:

(1) Wet film thickness (WFT) readings by coatings applicator(s);

(2) Non-visible contaminants testing for chlorides, sulfates, and nitrates (CSN);

(3) Abrasive testing per SSPC AB 1, SSPC AB 2, or SSPC AB 3;

(4) Holiday testing.

e. Writing a daily detailed summary of the work shift inspections, testing, and the day's events, including any meetings and prevalent conversations. The final daily report must include a project summary that will be part of the last daily coatings inspection report.

3.8 PROJECT IDENTIFICATION

At the completion of the work, affix pertinent coating data on structure at a location that is readily accessible and visible from the ground. Use either stencils or nameplates. The following list generally describes the pertinent coating data, but should be modified as required to describe the coating systems.

Date coated/accepted: _____/_____

Project Number: _____

Contractor: _____

Address: _____

Coating System

Manufacturer: _____

Surface Prep: SSPC SP ____ Profile: _____

Primer: _____ Thickness: ____

Intermediate: _____ Thickness: ____

Topcoat: _____ Thickness: ____

Total Thickness: _____

3.8.1 Stencils

Use stencils on piping 203 mm 8 in or larger. Use stencils with 3/4- to one-inch Helvetica style letters and acrylic stencil paint of contrasting color.

3.8.2 Nameplates

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NOTE: In a salt water environment, substitute acceptable non-corroding metal such as, but not limited to, nickel-copper, 304 stainless steel, or monel. Aluminum is unacceptable. Nomenclature (or system identification) should be established by the designer. Require melamine plastic nameplates for all NAVFAC projects.

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Use nameplates for piping smaller than 8 inches. Construct plates of [anodized aluminum][stainless steel][melamine plastic, 3 mm 0.125 in thick, UV resistance, black with white center core, matte finish surface and square corners][_____]. Install nameplates in prominent locations with nonferrous screws, nonferrous bolts, or permanent adhesive. Minimum size of nameplates must be 25 by 65 mm one by 2.5 in. Lettering must be the normal block style with a minimum 6 mm 0.25 in height. Accurately align all lettering on nameplates.[For plastic nameplates, engrave lettering into the white core.]

-- End of Section --