

SECTION 09 97 13

STEEL COATINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Surface preparation and application of coating system on exterior steel surfaces.
- B. Scope: Furnish and apply coatings and perform related work necessary to complete work shown or specified.

1.2 REFERENCES

- A. Reference Standards: Latest edition as of Specification date.
 - 1. ASTM International:
 - a. D3359: Standard Test Methods for Measuring Adhesion by Tape Test.
 - b. D4541: Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers.
 - 2. SSPC: The Society for Protective Coatings:
 - a. SSPC-SP 2: Hand Tool Cleaning.
 - b. SSPC-SP 3: Power Tool Cleaning.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
 - 1. With Owner’s Representative.
 - 2. With other trades:
 - a. To ensure that work done by other trades is complete and ready for coating Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, coating Work in progress.
 - c. To ensure that subsequent work will not adversely affect completed coating.
- B. Review repair and surface treatment materials and primers specified in other sections to ensure compatibility with steel coating to be used. Notify Engineer in writing of concerns with materials or primers installed by others and recommended remedies.
- C. Sequence surface preparation and coating application Work so that dust and other contaminants from surface preparation Work will not adversely affect wet, newly-coated surfaces.

1.4 SUBMITTALS

- A. Product Data: Coating manufacturer’s literature including written instructions for evaluating, preparing, and treating substrate; technical data including tested physical and performance properties; mixing and application instructions; safety precautions for handling, storing, applying, and disposing of materials; and instructions for protecting surrounding areas from overspray. Include:
 - 1. Surfaces to which materials will be applied.
 - 2. VOC content of components.
 - 3. Coating manufacturer’s color chart showing full range of colors available.

4. Decoding information to verify shelf life of materials.
 5. Include Globally Harmonized System (GHS) or, if not yet available, Material Safety Data Sheets for information only.
- B. Applicator Qualifications: Evidence that Applicator's *existing company* has minimum five years of continuous experience in similar coating work; list of at least five representative, successfully-completed projects of similar scope and size, including:
1. Project name.
 2. Owner's name.
 3. Owner's Representative name, address, and telephone number.
 4. Description of work.
 5. Coatings used.
 6. Project supervisor.
 7. Total cost of coating work and total cost of project.
 8. Completion date.
- C. Sample Warranty: Copy of Contractor's warranty, stating obligations, remedies, limitations, and exclusions. Submitted with bid.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Experienced firm that has successfully completed coating work similar in material, design, and extent to that indicated for Project; and that is approved by coating manufacturer to apply coating. Must have successful applications of specified materials in local area in use for minimum of five years.
1. Employ foreman trained with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Applicator; inform Engineer in advance of any changes.
 2. Coating applicator shall hold the following certification: SSPC Painting Contractor Certification Program, QP-1.
- B. Mockups: Prepare surface and apply coating system to representative member designated by Engineer to demonstrate surface preparation, aesthetic affects, and quality of materials and execution. Leave portion of prepared surface and each coating layer exposed to view.
1. Coating manufacturer's representative shall observe mockup and approve in writing surface preparation and coating application.
 2. Owner may, at its expense, verify coating thickness and perform adhesion and pull-off tests. Contractor shall, at no cost to Owner, repair coating and substrate damaged by testing.
 3. If Engineer determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved. Pay for additional testing requested by Owner. Do not proceed with coating Work until mockup is approved.
 4. Approved mockup will be acceptance standard for remainder of coating Work.
 5. Approved mockup may become part of completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials according to manufacturer's recommendations and in such a manner as to prevent damage to materials or structure.
- B. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with:

1. Manufacturer's name.
 2. Product brand name, type, and color.
 3. Color name and number.
 4. Date of manufacture and batch number.
 5. Directions for storing, handling, mixing with other components, and application, including precautions.
 6. Thinning instructions if applicable.
- C. Store materials in original, undamaged containers and, if permitted, partially-used materials in tightly-covered containers in clean, dry, well-ventilated, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Protect stored materials from direct sunlight, heat, sparks, and flames.
- D. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
- E. Conspicuously mark damaged or opened containers or containers with contaminated materials, and remove from Site as soon as possible.
- F. Remove and replace materials that cannot be applied within stated shelf life.

1.7 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to start of coating Work. Notify Engineer of conditions found to be different than those indicated in the Contract Documents. Engineer will review situation and inform Contractor and Applicator of changes.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
- C. Environmental Limitations: Apply coating when existing and forecast weather conditions permit coating to be applied according to coating manufacturer's written instructions.
1. Do not apply when substrate and ambient temperatures are less than 50 degrees F or more than 95 degrees F, or outside of range recommended by coating manufacturer. Maintain minimum substrate and ambient temperatures for at least 24 hours before and after coating application.
 2. Do not apply to damp or wet substrates; in snow, rain, fog, or mist; when relative humidity exceeds 80 percent or maximum value recommended by coating manufacturer; or when substrate temperature is less than 5 degrees F above dew point.
- D. Handle and install materials in strict accordance with safety requirements required by coating manufacturer; GHS or Material Safety Data Sheets; and local, state, and federal rules and regulations. Maintain GHS or Material Safety Data Sheets with materials in storage area and available for ready reference on Site.

1.8 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
1. Notify Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

1.9 WARRANTY

- A. Contractor Warranty:
 - 1. Written warranty, signed by Contractor, including:
 - a. Repair or remove and replace coating that does not comply with requirements; that fails in adhesion, cohesion, or general durability; that cracks, checks, fades, or chalks; where visible rust occurs; or that deteriorates in a manner not clearly specified by submitted coating manufacturer's data as an inherent quality of the material for the application indicated.
 - 2. Warranty includes:
 - a. Adhesive or cohesive failure of existing coating that remains in place.
 - b. Providing access to warranty Work.
 - c. Necessary surface preparation work.
 - 3. Warranty Period: Three years after Substantial Completion date.

PART 2 PRODUCTS

2.1 ABRASIVE BLAST MATERIAL

- A. Starblast XL Blasting Abrasives as manufactured by DuPont or equal.
- B. Abrasives used for blast cleaning shall meet the requirements of SSPC AB1 and shall be clean, oil-free, dry mineral sand, mineral grit, or manufactured grit and shall have a size and gradation that the abrasive will produce a uniform profile within the specified range as required for the selected coating system. Abrasive shall be free from contaminants such as excessive fine particles, paint, oils, moisture, chlorides, and heavy metals, or toxic material prohibited by OSHA or federal, Owner, or local regulations.
 - 1. Abrasives resulting in an unacceptable degree of embedment will be rejected.
 - 2. Abrasive shall have a chloride content no greater than 7 ppm when tested with the Chloride Ion Test Kit for Abrasive.
- C. The abrasive material shall produce a dense, angular, and uniform profile acceptable for application of the intended coating.
- D. Blast media shall be California Air Resources Board (CARB) approved.
 - 1. Abrasives shall not contain metals or other substances that would classify abrasive as a hazardous waste under California Title 22 requirements.
 - 2. Maximum VOC limits shall comply with Sacramento Metropolitan Air Quality Management District (SMAQMD) Rule 442 and Rule 451.

2.2 STEEL COATING MATERIALS

- A. Source Limitations: Obtain materials through one source from single coating manufacturer, or from sources approved by coating manufacturer.
- B. Material Compatibility: Provide primers, intermediate coats, finish coats, and related materials that are compatible with one another and substrates indicated under conditions of application and service, as demonstrated by manufacturer based on testing and field experience.

- C. Material Quality: Provide manufacturer’s best-quality coating materials that are factory formulated and are recommended by manufacturer for application indicated. Material containers not displaying manufacturer’s product identification are not acceptable.
- D. Use one of the following systems or submitted and approved equal, as indicated in project Structural Drawings:
 - 1. System 1: Existing ductile or cast iron manhole frames and manhole covers
 - a. Carboline Company:
 - 1) Surface Preparation, all non-embedded surfaces:
 - a) Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.
 - b) Abrasive blast to SSPC SP-10.
 - 2) Prime Coat: None
 - 3) Finish Coat: Carboguard 890 VOC, two coats, 4-6 mils DFT per coat
 - 2. System 2: Non-submerged, existing galvanized steel
 - a. Carboline Company:
 - 1) Surface Preparation, all non-embedded surfaces:
 - a) Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.
 - b) Abrasive blast to SSPC SP-10.
 - 2) Prime Coat: None
 - 3) Finish Coat: Carboguard 890 VOC, two coats, 4-6 mils DFT per coat

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Applicator and coating manufacturer’s representative for compliance with requirements and other conditions affecting application or performance of coating.
 - 1. Ensure that work done by other trades is complete and ready for coating Work.
 - 2. Verify that areas and conditions under which coating Work is to be performed permit proper and timely completion of Work.
 - 3. Verify compatibility with and suitability of substrates, including existing coatings.
 - 4. Verify adhesion of existing coatings.
 - 5. Notify Engineer in writing of conditions which may adversely affect application or performance of coating and recommend corrections.
 - 6. Do not proceed with coating Work until adverse conditions have been corrected and reviewed by Engineer.
 - 7. Commencing coating Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.

- B. Prevent construction debris, coatings, and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas. Provide “Wet Paint” signs to protect newly coated surfaces.
- E. Take precautions to protect against air-borne materials and runoff.
- F. Masking and Preparation:
 - 1. Comply with coating manufacturer’s written instructions for protecting building and other surfaces against damage from exposure to its products.
 - 2. Cover adjacent surfaces with materials that are proven to resist coating system.
 - 3. Mask off or protect from spatter, overspray, or other damage surfaces not scheduled to receive coating.
 - 4. Remove masking and other protective measures at completion of coating Work.
- G. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.
- H. Abrasive blasting containment system:
 - 1. Provide a Class 3A Containment System in accordance with SSPC Technology Guide 6.
 - 2. Utilize Method G, Visual Assessment of Site Cleanliness, to monitor the amount of dust or debris that may escape the work area.

3.3 SURFACE PREPARATION

- A. All weld spatter should be removed and all surface imperfections of welds repaired as necessary as described in NACE SP0178, Condition C utilizing SSPC SP2, SP3, SP15 and/or SP11.
- B. Conduct quality control testing prior to, during, and after surface preparation and coating application.
 - 1. SSPC-Vis-1 shall be used as a guide to judge surfaces prepared by abrasive blasting
- C. Substrate: Clean and prepare substrate according to coating manufacturer’s written instructions and sub-section 2.1 of this Specification. Provide clean, dust-free, dry, and sound substrate for coating application. Remove all visible oil, grease, dust, dirt, and other foreign matter in accordance with SSPC-SP 1.
- D. Applicator and coating manufacturer’s representative shall examine substrate to ensure that it is properly prepared and ready to receive coating.
 - 1. Coating manufacturer’s representative shall report in writing to Applicator and Engineer conditions which may adversely affect coating system application or performance and recommend corrections.
 - 2. Do not proceed with coating application until unsatisfactory conditions have been corrected and reviewed by Engineer.
 - 3. Commencing coating application constitutes acceptance of Work surfaces and conditions.

3.4 APPLICATION

- A. General: Prepare and apply materials according to coating manufacturer's written instructions, at recommended rates and coverages.
- B. Test prepared surfaces for moisture and other conditions as recommended by coating manufacturer. Verify that ambient air and substrate surface temperatures, relative humidity, and dew point are within ranges recommended by coating manufacturer and are forecast to remain within these ranges during coating curing period.
- C. Mix materials thoroughly to a uniform, smooth consistency. Do not thin or dilute unless permitted by coating manufacturer; use recommended thinners within recommended limits.
 1. Stir as required during application.
 2. If surface film forms, do not stir film into material. Remove film and strain coating material before using.
 3. Maintain containers used for mixing and applying coating in clean condition, free of foreign materials and residue.
- D. Apply coating by roller, spray, or brush. Use applicator and technique best suited for substrate and type of material being applied.
 1. Apply materials as soon as practicable after completion of surface preparation or full curing of previous material application.
 2. Do not coat over conditions detrimental to formation of durable coating film, such as dirt, rust, scale, grease, or moist or scuffed surfaces.
 3. Stripe Coat: Apply brush-applied stripe coat during each coating application (i.e. primer, intermediate, and finish coat) to all welds, bolts, threads, corners, and edges.
 4. Prime exposed steel surfaces to specified thickness or as recommended by coating manufacturer, whichever is greater.
 5. After the steel is primed, it shall be cleaned as needed to ensure no surface contaminants are present before subsequent coating. If more than 3 weeks has elapsed since the steel was primed, or if in the opinion of the Engineer the surface is unfit for top coating, the surface shall be scrubbed with a mild detergent solution (any commercial laundry detergent), thoroughly rinsed with water, and allowed to dry for 24 hours before the surface is coated.
 6. Apply finish coat in one or two coats to provide specified thickness or as recommended by coating manufacturer, whichever is greater. Do not apply second coat until first coat has fully cured. Select application method to avoid excessive coating thickness.
 - a. If undercoats or other conditions show through final coat, apply additional coats until coating film is of uniform finish, color, and appearance, if approved by Engineer.
 - b. Ensure that edges, corners, and crevices receive minimum dry film thickness.
 - c. Brush Application: Work material into surface in even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw lines at edges and color breaks.
 - d. Roller Application: Keep cover wet; do not dry roll. Apply material in sections. Lay on required amount of material, working material into grooves and rough areas. Then level material, working it into surface.
 - e. Spray Application: Use spray application only when permitted by manufacturer's written instructions and authorities having jurisdiction. Apply material to provide equivalent hiding of brush-applied coat. Do not double back, building up film thickness of two coats in one application.
 7. Do not coat over UL, FMG, or other labels.

3.5 REPAIR PORCEDURE

- A. Repairs to coating may become necessary due to chemical exposure or mechanical damage. Perform repairs as specified herein, or as otherwise required by the coating manufacturer.
- B. Solvent clean the areas in accordance with SSPC SP1 using an appropriate and effective solvent, then to abrade the damage area to sound primer, or in the case of damaged primer, to sound substrate by whatever means feasible.
- C. The area immediately adjacent to the repair should also be SP 1 cleaned and feather-edge abraded and blended into the repair area; extending into the sound coating 2 to 4 inches. Ensure all areas to be coated are contaminant/chemical free.
- D. The abraded prepared area should then be again solvent wiped with an appropriate solvent and the coating then applied to a clean, dry, and contaminant free surface.
- E. The application of the coating(s) should begin in the repair area and extend into the feather-edged margin, with care being taken to keep the application within the abraded area(s).

3.6 FIELD QUALITY CONTROL

- A. Material Coverage Rates.
 - 1. At beginning of application, calibrate material coverage rate with wet-mil thickness equivalent to minimum specified dry-mil thickness. Measure wet-mil thickness with thickness gauge.
 - 2. Measure wet-mil thickness at least once for every 10 square feet of surface coated. Adjust coverage rate to maintain minimum thickness.
- B. Contractor shall record expiration date, batch, and lot number of sealant and coating material prior to application and installation. Maintain records and submit as part of project closeout documents.
- C. Contractor will engage a qualified Coating Specialist (NACE Coating Inspector - Level 2 Certified, or equivalent) to perform quality assurance testing. Coating Specialist to maintain log of all testing activities, frequencies, and results. Contractor to submit log to Owner and Engineer upon completion of each day's activities. The Coating Specialist will perform the following tests and measurements at the following frequencies:
 - 1. Review and verify proper surface preparation prior to coating application. Measure surface profile of prepared steel surface in accordance with ASTM D4417 not less than one measurement (average of three readings) per 50 sq. ft. of surface preparation.
 - 2. Measure wet-mil thickness in accordance with ASTM D4414 at least once for every 25 square feet of surface coated. Adjust coverage rate to maintain minimum thickness.
 - 3. Verify dry film thickness of the coating using method and frequency recommended by manufacturer or according to ASTM D7091 and SSPC PA2 Procedure for Determining Conformance to Dry Coating Thickness Requirements but not less than one measurement per 50 sq. ft. of coating application. The dry film thickness measured must be in accordance with SSPC PA2 Level 1. If the coating thickness is not satisfactory, coatings shall be installed at no added cost to the Owner.
- D. Contractor shall reapply coating in areas disturbed by testing.

- E. Owner may, at its expense, perform the following tests. Contractor shall provide access to test locations determined by Engineer.
 - 1. Measure dry-film thickness of coating. Coating thickness is acceptable if within specified range.
 - 2. Perform adhesion tests per ASTM C3359, Test Method A, after coating has cured. Coating adhesion is acceptable if no peeling or coating removal occurs (Rating 5A).
 - 3. Perform pull-off tests per ASTM D4541, after coating has cured. Coating application is acceptable if test results are at least 250 pounds per square inch.
 - 4. If coating application is acceptable, Owner will pay Contractor to repair substrate and coating as necessary at test locations.
 - 5. If coating application is unacceptable, Engineer will determine remedy. Contractor shall remove and replace unacceptable coating or perform other remedial actions at no cost to Owner. Contractor shall also repair substrate and coating at test locations with unacceptable results at no cost to Owner. Contractor may, at own expense, perform additional measurements and testing to determine limits of areas with unacceptable coating.

- F. Completed Work shall match approved mockup for color, texture, and coverage, in opinion of Engineer, and shall be free from flow-lines, streaks, blisters, and other surface imperfections. Remove, refinish, or recoat Work not complying with specified requirements.

3.7 CLEANING

- A. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.

- B. After completing coating Work:
 - 1. Clean spillage, overspray, and spatter from adjacent surfaces using cleaning agents and procedures recommended by manufacturer. Exercise care to avoid scratching or damage to surfaces.
 - 2. Repair surfaces stained, marred, or otherwise damaged during coating Work.
 - 3. Clean up debris and surplus materials and remove from Site.

END OF SECTION