

Item No. 530
High Performance Coatings**Notes to Specifier:**

Delete these notes and parts that are not applicable.

Where options are given, make appropriate selection and delete the other option, fill in all blanks.

Verify all references to paragraphs within this specification and to any applicable Sections, standards or other specified sources of information.

This specification must be modified for removal of existing coatings or rehabilitating existing facilities where the existing coatings contain heavy metals.

Verify specification with approved manufacturers prior to use.

530.1 Description

Furnish labor, materials, equipment and incidentals necessary to apply protective coatings to material and equipment as specified herein, including the preparation of surfaces prior to application of coatings.

- A. Protective coatings are special coatings to be used at specific locations or on specific surfaces as indicated herein in that every surface of every description, except those which are specifically noted not to receive a coating finish, must be covered by a paint system as specified in this Section.
- B. Protective coatings must be applied to the following surfaces:
 - a. Metal surfaces located outside of buildings and other structures anywhere on the Site.
 - b. Structural steel located in the following areas: **[Specify/list as necessary for each project.]**
 - c. Hot-Dip Galvanized Steel: **[Specify/list as necessary for each project.]**
 - d. New piping and valves, except **[including]: [Specify/list as necessary for each project.]**
 - e. Concrete surfaces at the following locations: **[Specify/list as necessary for each project.]**
 - f. Existing Piping and Valves: **[Specify/list as necessary for each project.]**
 - g. Petrolatum (Wax) Tape at the following locations:
 - i. Buried flexible couplings.,
 - ii. **[Specify/list as necessary for each project.]**
- C. The following must not be coated and must be protected from drips, overspray, etc. unless indicated otherwise
 - 1. Stainless steel piping, materials and equipment.

2. Galvanized steel piping, materials and equipment unless specifically indicated to be coated.
 3. Aluminum materials and equipment.
 4. Interior electrical items.
 - 5. [Specify/list as necessary for each project.]**
- D. Special applications for painting include the following:
1. Aluminum surfaces in contact with or embedded in concrete must be coated with a zinc rich primer. Primer shall be:
 - i. Tneme-Zinc; Tnemec Company, Inc.
 - ii. MasterProtect P 8100AP; Master Builders Solutions US LLC.
 - iii. Approved equal.
 2. Buried pipe and valves must receive a shop applied protective coating as described in the appropriate Section of the Specifications.
- E. Contain, treat, and dispose of any dust, spray, drainage, or spillage resulting from coating operations. It is the Contractor's responsibility to determine if the materials to be disposed of are classified as Hazardous Waste. Disposed of waste, hazardous or otherwise, must be in accordance with applicable regulations. Contractor must be aware of and understand the regulations concerning disposal of waste generated by coating operations.

530.2 Quality Assurance

- A. Acceptable Manufacturers: Products which comply with the Contract Documents and are manufactured by the following companies will be acceptable:
1. Tnemec Company, Inc.
 2. Carboline.
 3. PPG Protective & Marine Coatings.
 4. The Sherwin-Williams Company.
 5. Akzo Nobel / International Paint, LLC.
 6. ICI Devoe High Performance Coatings.
 7. Plasite Protective Coatings.
- It is desired that the paint products be furnished by as few manufacturers as possible to meet the requirements of the Specifications. Coating products of the same type must be supplied by the same manufacturer. Do not mix products from different sources.
- B. Applicator's Qualifications: Applicators must be qualified in this line of work and have a minimum of 5 years of experience in the application of the protective coatings of the types specified herein. Submit a list of recent projects and names of references for those projects.
- C. Product Quality:
1. Use only the coatings specified in this Section. Use only those thinners and solvents recommended by the manufacturer, only in the amounts necessary to

produce the manufacturer's recommended spreading rate, and in amounts not exceeding the maximum quantities stated in the manufacturer's literature.

2. The coating material must not show excessive settling in a freshly opened full can and must be easily re-dispersed with a paddle to a smooth, homogeneous state. It must show no curdling, livering, caking, or color separation and must be free of lumps or skim surfaces.
- D. Inspection:
1. Inspect and provide substrate surfaces prepared in accordance with the Contract Documents and the printed directions and recommendations of paint manufacturer whose product is to be applied.
 2. Provide Engineer and NBU minimum 3 days of notice prior to start of surface preparation work or coating application work.
- E. Perform Work only in the presence of Engineer, unless Engineer grants prior approval to perform such Work in Engineer's absence. Approval to perform Work in the Engineer's absence is limited to the current day unless specifically noted to extend beyond the completion of the workday.
1. Inspection by the Engineer, or the waiver of inspection of any particular portion of the Work, does not relieve the Contractor of responsibility to perform the Work in accordance with the Contract Documents.
 2. Contractor is solely responsible for testing for this Section, at no further cost to the Owner. Engineer may also make such tests if it is considered necessary. Cooperate with the Engineer, providing equipment, scaffolds, and other equipment as requested by the Engineer.
- F. Testing Equipment: Furnish the testing apparatus necessary for testing coatings, including the following:
1. One set of U.S. Department of Commerce thickness calibration plates, certified by the National Bureau of Standards, to test dry film thickness.
 2. Wet-film thickness gauges. Give one to Owner's representative. Each painter must keep one to test paint as it is applied.
 3. One electronic dry-film thickness gauge capable of measuring 0-200 mils with calibration standards approved by the Bureau of Standards.
 4. One Elcometer 319 Dewpoint Meter or approved equal.
 5. One Tinker and Razor Model M 1 Holiday Detector and recommended wetting agent and/or High Voltage Holiday Detector if required for coating thickness specified.
 6. One set of SSPC-VIS 1, 3 and 4 - Visual Standards as applicable.
- G. Testing Reports: Submit an inspection report for each coating applied on the Project. The testing report must be completed on a form furnished by the Engineer and must bear the signature of the Contractor and the Owner's representative.

530.3 Submittals

The following Product Data for products, including manufacturer's data sheets, are due prior to ordering coating and surface preparation materials:

- A. Coating manufacturer's color selection literature for coating materials and caulk.
- B. Sample warranty document for products.
- C. Provide certification from the manufacturer that all coatings will not contain more than 0.06 percent by weight of lead in the cured coating for each coat applied.
- D. Coating manufacturer's Product Information and Safety Data Sheets (SDS) for each coating and caulk material. Product Information must include the following:
 1. The manufacturer's published instructions for use in specifying and applying all proposed coatings.
 2. Application instructions written and published by the coating manufacturer.
 3. All anticipated limitations, precautions and requirements that may adversely affect the coating, that may cause unsatisfactory results after the application or that may cause the coating not to serve the purpose for which it was intended, must be clearly and completely stated in the instructions. Limitations and requirements must include, but are not necessarily limited to the following:
 - i. Surface preparation.
 - ii. Method(s) of application.
 - iii. Thickness of each coat (maximum and minimum DFT).
 - iv. Drying and curing time of each coat.
 - v. Time (minimum and maximum) allowed between coats.
 - vi. Thinner and use of thinner.
 - vii. Proper mixing of coating before application.
 - viii. Weather limitations during and after application (temperature and humidity, time weighted).
 - ix. Physical properties of coating, including percent solids content by volume.
 - x. Equipment settings (air cap, fluid tip, equipment pressure settings, etc.).
 - xi. Pot life at various temperature and humidity conditions.
 - xii. Provide documentation that interior coating system is compatible with the cathodic protection system.

The following samples are required prior to ordering the materials:

- A. Three samples of selected exterior finish colors for approval on 6-inch by 6-inch swatches. Label each swatch with the manufacturer's name, coating name/type, color name and number.

The following Product Data is required prior to coating Work:

- A. Coating Plan:
 1. Anticipated coating process schedule by date, including dates when hold-point inspections are anticipated. Schedule must indicate detailed activities on a daily basis.

2. Detailed procedures and schedule for all pre-cleaning, surface preparation and application of coating, including touch-up and repair procedures for all coating systems.
 3. Recoat schedule on the submitted coating materials.
 4. Data sheets must include curing characteristics and recommendations regarding complete coating curing.
 5. Provide a written plan documenting how spent cleaning debris and/or paint over spray or droplets will be contained/confined to the jobsite and tank site during the surface preparation and coating application operations. Reasonable care must be exercised by the Contractor to prevent damage, nuisance, or hazardous conditions to adjacent or nearby property owners. Include all materials and method to be used for protection of exterior surfaces and allow for recovery and disposal of paint scraps and blast media.
- B. Provide documentation on proposed containment system methods for blasting and coating operations.
- C. Contractor must submit evidence of notification of the appropriate office of the Texas Commission on Environmental Quality (TCEQ) prior to abrasive blasting as required. Submit copies of any obtained permits.
- D. Coating Manifest - Within 48 hours of coating delivery to the jobsite, the Contractor must record the batch number stamped on each coating container and submit a typed list to the Owner’s representative. Minimum information required is listed below.
1. Date of delivery to jobsite.
 2. Name and signature of superintendent recording the data.
 3. List of batch number including corresponding coating identification, color, date of manufacture and volume of each container.
- E. The following Certified Test Report(s) are required prior to coating Work:
1. SDS sheets for all abrasive to be used on the Project.
 2. Certification and laboratory test results indicating recycled metallic abrasive per SSPC. AB 2 or 4 and atomic absorption test results.

530.4 Standards

The following standards dictate standards used in project:

- A. NSF International (NSF) / American National Standards Institute (ANSI):

NSF/ANSI Standard 61	Drinking Water System Components – Health Effects
NSF/ANSI/CAN 600	Health Effects Evaluation and Criteria for Chemicals in Drinking Water

- B. ASTM International (ASTM):

ASTM A780	Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM D523	Standard Test Method for Specular Gloss

ASTM D610	Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D2244	Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D3359	Standard Test Methods for Rating Adhesion by Tape Test
ASTM D4214	Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D4258	Standard Practice for Surface Cleaning Concrete for Coating
ASTM D4259	Standard Practice for Abrading Concrete
ASTM D4260	Standard Practice for Liquid and Gelled Acid Etching of Concrete
ASTM D4263	Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4285	Standard Test Method of Indicating Oil and Water in Compressed Air
ASTM D4417	Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
ASTM D4541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Tester
ASTM D4787	Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates
ASTM D5162	Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates
ASTM D6386	Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
ASTM D7234	Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Pull-Off Adhesion Testers
ASTM D7682	Standard Test Method for Replication and Measurement of Concrete Surface Profiles Using Replica Putty
ASTM E337	Standard Practice Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures)
ASTM F1869	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

C. American Water Works Association (AWWA):

AWWA C210	Liquid-Epoxy Coating and Linings for Steel Water Pipelines
AWWA C222	Polyurethane Coatings and Linings for Steel Water Pipe and Fittings

- D. Consumer Product Safety Act, Part 1303.
- E. Environmental Protection Agency (EPA).
- F. International Concrete Repair Institute (ICRI):

Technical Guideline No. 03732	Selecting and Specifying Concrete Surface Preparation for Coatings, Sealers and Polymer Overlays
Standard 310.2	Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays and Concrete Repair with CSP Chips

- G. Association for Materials Protection and Performance (AMPP) (formally NACE/SSPC):

NACE TPC2	Coating and Lining for Immersion Service: Chapter Safety, Chapter 2 Surface Preparation, Chapter 3 Curing, and Chapter 4 Inspection
NACE SP0178	Design Fabrication, and Surface Finish Practices for Tanks and Vessels to be Lined for Immersion Service
NACE SP0188	Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates
NACE SP0178	Surface Finishing of Welds Prior to Coating; Weld Replica Only to be used with NACE SP0178
NACE RP0287	Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape
SSPC-VIS 1	Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
SSPC-VIS 3	Guide and Reference Photographs for Steel Surfaces Prepared by Power and Hand Tool Cleaning
SSPC Vol. 1	Good Painting Practices
SSPC-AB 1	Mineral and Slag Abrasives
SSPC-AB 2	Cleanliness of Recycled Ferrous Metallic Abrasives
SSPC-AB 3	Ferrous Metallic Abrasives
SSPC-AB 4	Recyclable Encapsulated Abrasive Media in a Compressible Matrix
SSPC-SP 1	Solvent Cleaning
SSPC-SP 2	Hand Tool Cleaning
SSPC-SP 3	Power Tool Cleaning
SSPC-SP 11	Bare Metal Power Tool Cleaning
SSPC-SP I6	Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals
SSPC-PA 1	Shop, Field and Maintenance Painting of Steel
SSPC-PA 2	Determining Compliance to Required DFT
SSPC-PA 10	Guide to Safety and Health Requirements for Industrial Painting Projects
SSPC-PA 17	Procedure for Determining Conformance to Steel Profile/Surface Roughness/Peak Count Requirements
SSPAC Paint #20	Organic Zinc Rich Primer, Type II
SSPC Guide 6 (CON)	Containment of Debris
SSPC Guide 12	Illumination of Painting Projects

SSPC Guide 15	Retrieval and Analysis of Soluble Salts
SSPC-SP 5/NACE 1	White Metal Blast Cleaning
SSPC-SP 6/NACE 3	Commercial Blast Cleaning
SSPC-SP 7/NACE 4	Brush - Off Blast Cleaning
SSPC-SP 10/NACE 2	Near - White Metal Blast Cleaning
SSPC-SP 13/NACE 6	Surface Preparation of Concrete

H. National Association of Pipe Fabricators (NAPF):

NAPF 500-03	Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings
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I. Occupational Safety & Health Administration (OHSA):

1915.35 Standards - 29 CFR	Painting
1926.62 Standards - 29 CFR	Lead

J. Texas Commission on Environmental Quality (TCEQ):

30 TAC Chapter 290, Subchapter D	Rules and Regulations for Public Water Systems
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530.5 Environmental Conditions

1. Do not apply coatings under conditions that are unsuitable for the production of good results. Remove trash and debris from enclosed buildings and thoroughly clean prior to application of coatings. Do not begin application of coatings in areas where other trades are working, or where construction activities result in airborne dust or other debris. Do not apply coatings in conditions which do not conform to the recommendations of the coatings manufacturer.
2. Coatings must only be applied when conditions fall within the parameters listed in the manufacturer’s printed data.
3. Contractor must provide dehumidification equipment sized to maintain dew point temperature 5 deg F or more above surface temperature of metal surfaces to be prepared and coated.
4. Do not apply any coatings when weather conditions are unfavorable. In the event that climatic conditions are not conducive for best results, postpone application of coatings until conditions conform to the manufacturer’s recommendations and the provisions of this Section.
5. Do not apply coatings to a wet or damp surface in wet or damp weather conditions, or when there is dust in the air. Surfaces exposed to direct sunlight must be shaded by awnings or other protective devices while coatings are being applied, if recommended by coating manufacturer. When necessary, provide temporary heating devices of a type that produces no fumes or water vapor which will discolor the paint system.

6. Heating and Dehumidification:
 - A. Dehumidification equipment must be used to control the environment during surface preparation, rehabilitation, coating application and coating curing at no additional cost to the Owner, if acceptable environmental conditions cannot be met.
 - B. If the Contractor cannot meet the required environmental conditions to apply the interior coating system per this Section and the coating manufacturer's written recommendations, Contractor will cease operations until approved dehumidification equipment has been provided and acceptable environmental conditions are achieved.
 - C. If coating system is applied without dehumidification or in conditions not acceptable by this Section and by the coating manufacturer's written requirements, Contractor must fully remove coating system applied and replace per the Engineer's direction.
 - D. Contractor must furnish all labor, materials, equipment, fabrication and quality control inspections, and all other incidentals required to control and maintain the environment of the reservoir within the parameters stated in this Section and must incorporate these and any other expenses into its bid.
 - E. Owner reserves the rights, in the event the dehumidification equipment is not performing to the minimum requirements stated in this Section, to require the Contractor to modify and or add additional equipment to satisfy the conditions of this Section, at the sole cost to the Contractor.
 - F. It is the Contractor's responsibility to provide adequate dehumidification equipment to meet this specification and the coating manufacturer's requirements of this Section and coating manufacturer's requirements. The coating manufacturer's limits of surface temperature, tank inside air temperature and relative humidity requirements will govern, if more stringent than the requirements stated within this Section.
7. Forced Ventilation:
 - A. Provide continuous forced fresh air ventilation when working inside of containment systems or enclosed areas that are not openly vented from the beginning of surface preparation through final coating operations and coating curing.
 - B. Forced ventilation must be supplied per the recoat time required by the coating manufacturer and at least 48 hours after the final coat has been applied.
 - C. From the beginning of interior coating applications to until the coating system is cured, the Contractor must monitor the air for the lower explosion limit (LEL) as published in the coating manufacturer's product SDS.
 - D. Contractor is responsible for supplying, installing and maintaining the forced ventilation system.
8. Containment System:
 - A. Contractor must provide containment methods, either full or partial, which allows for the containment of the environmentally sensitive waste, dust and paint over spray that will be generated during the abrasive blasting and painting operation.

Note to Specifier: Class 1A/1W/1P should be specified when removing coatings with heavy metals. Class 2A/2W/2P may be specified for most projects with abrasive blasting. For smaller projects, minimal coatings, class 3A/2W/2P may be specified as a minimum.

- B. Minimum Containment for Field Surface Preparation:
 - 1. Provide a minimum SSPC Guide 6 (CON) Class [1A] [2A] [3A.D1.E3] containment system when dry abrasive blasting.
 - 2. Provide a minimum SSPC Guide 6 (CON) Class [1W] [2W] containment system when wet abrasive blasting. All water must be contained and properly disposed of.
 - 3. Provide a minimum SSPC Guide 6 (CON) Class [1P] [2P.E3] containment system when power tool cleaning.
 - C. The ground surrounding the project area must be protected from all debris, emissions, dust, and other materials generated in the cleaning operations with a minimum of two layers of polyethylene covered with plywood or the same material used for the perimeter containment system.
 - D. Containment is not required when blasting on the interior of a completely enclosed area (i.e. roof is in place) as long as no visible emissions are created.
 - E. Contractor must ensure that no spent cleaning/blasting debris, dust, overspray, coating droplets, or emissions of any kind, escape to the atmosphere, or to adjacent buildings, private property, work sites, parking lots, etc.
 - F. Owner reserves the right to stop Work or require containment, additional containment or different containment methods if the Contractor's operations create a nuisance beyond the tank site property line in the sole opinion of the Owner, the Engineer, the Owner's representative, any regulatory agency, or neighbor. All costs of providing an adequate containment system must be included by the Contractor in the Base Bid.
 - G. Contractor will be responsible for all materials that are used and for any apparatus used to contain dust emissions, debris, overspray, and coating droplets. The containment system attachments to existing or proposed structures must be designed by a professional engineer, licensed in the state where the Project is located, not to impose excessive loading on the structure. Contractor must submit the designed and sealed details of the containment system on the tank.
 - H. Any damage to the structure(s) as a direct or indirect result of the containment system must be repaired or sections replaced by the Contractor at no additional cost to the Owner. Neither the Owner, nor the Owner's Engineer, assumes any responsibility for the structural ability of the structure to support the containment system.
 - I. If tarps are used as part of the containment system, the tarps must be an impervious, solid, flame-resistant material, reinforced with a fiber mesh and must allow as much light as possible to pass through the material.
9. Visible Emissions:
- A. Contractor must control visible emissions and releases while dust producing activities are underway.

- B. Visible emissions more than SSPC Guide 6, Level 1 (1 percent of the workday or 5 minutes in an 8-hour shift) are unacceptable. Sustained emissions of more than 1 minute, regardless of the total time of emissions for the day is unacceptable. If unacceptable emissions are observed, Contractor must shut down immediately and correct the situation and clean up any debris generated from the release to the satisfaction of the Engineer before continuing Work.

530.6 Working Conditions

- A. Provide adequate lighting at any location that coatings are being applied or testing is performed. Illumination must be of sufficient intensity to achieve good results. Provide explosion-proof lighting when required.
- B. Temporary ladders and scaffolds must conform to applicable safety requirements. Erect temporary scaffolds where needed to cover large areas. Provide ladders or scaffolding during testing procedures.

530.7 Materials

- A. Coating products are to be as follows:

Type A - Alkyd-Phenolic Universal Primer	
Manufacturer	Approved Coating
Tnemec	Series 37H Chem-Prime H.S.
Sherwin-Williams	Kem Kromik Universal
Akzo Nobel / International Paint, LLC	Interlac 573
Devoe Coatings	Devprime 1403
Carboline	Carbocoat 150UP
PPG	Multiprime 4360

Type B - Epoxy-Polyamide Primer	
Manufacturer	Approved Coating
Tnemec	Series 66
Sherwin-Williams	Copoxy Primer
Akzo Nobel / International Paint, LLC	Intergard 251; Intergard 269 for valves and gates, submerged structural steel and misc. metals, and submerged piping
Devoe Coatings	Devran 201V Series
Carboline	890
PPG	Amercoat 385

Type C - Penetrating Epoxy Pre-Primer	
Manufacturer	Approved Coating
Tnemec	Approved Equal
Sherwin-Williams	Macropoxy 920 Pre-Prime
Akzo Nobel / International Paint, LLC	Interbond 600
Devoe Coatings	Approved Equal
Carboline	Rustbond Penetrating Sealer
PPG	Amerlock Sealer

Type D - Inorganic Zinc Primer (Minimum 80% Zinc by Weight)	
Manufacturer	Approved Coating
Tnemec	Series 90-98 Tneme-Zinc
Carboline	Carbozinc 12 VOC
Sherwin-Williams	Zinc Clad II Plus
PPG	Dimetcote 9 VOC

Type E - Organic Zinc Primer (Minimum 80% Zinc by Weight)	
Manufacturer	Approved Coating
Tnemec	Series 90-97 or 90G-1K97 Tneme-Zinc
Carboline	Carbozinc 859
Sherwin-Williams	Corothane I Galvapac
PPG	Amercoat 68HS
Akzo Nobel / International Paint, LLC	Interzinc 52

Type F - Alkyd Enamel	
Manufacturer	Approved Coating
Tnemec	Series 2H Hi-Build Tneme-Gloss
Sherwin-Williams	DTM Alkyd Enamel
Akzo Nobel / International Paint, LLC	Interlac 665
Devoe Coatings	Devlac 1431
Carboline	Carbocoat 8225
PPG	Fast Dry 35

Type G - Epoxy-Polyamide Coatings	
Manufacturer	Approved Coating
Tnemec	Series 66
Sherwin-Williams	Macropoxy 646 Epoxy
Akzo Nobel / International Paint, LLC	Intergurd 475HS; Interseal 670HS for valves and gates, PVC pipe and conduit, submerged structural steel and misc. metals, and submerged piping
Devoe Coatings	Bar-Rust 235
Carboline	Carboguard 60
PPG	Amerlock 385

Type H – NSF/ANSI 600 Coatings for Potable Water (NSF 61 Certified)	
Manufacturer	Approved Coating
Tnemec	Approved Equal
Sherwin-Williams	Sher-Plate 600 Epoxy
Akzo Nobel / International Paint, LLC	Interline 850 or Interseal 670HS (NSF colors)
Devoe Coatings	Bar-Rust 233H Series
Carboline	Carboguard 61
PPG	Amerlock 2/400

Type I - Aliphatic Polyurethane Enamel	
Manufacturer	Approved Coating
Tnemec	Series 1094 Endura-Shield
Sherwin-Williams	Hi-Solids Polyurethane
Akzo Nobel / International Paint, LLC	Interthane 990 Series
Devoe Coatings	Devthane 379 Series
Carboline	Carbothane 133HB (Satin) or Carbothane 134HG (High Gloss)
PPG	Pitthane Ultra Series

Type J - Silicone Aluminum Coatings for High Temperature	
Manufacturer	Approved Coating
Tnemec	Series 39 Silicone Aluminum
Sherwin-Williams	Heatflex 500 Aluminum

Type J - Silicone Aluminum Coatings for High Temperature	
Manufacturer	Approved Coating
Akzo Nobel / International Paint, LLC	Intertherm 50 Series
Devoe Coatings	Intertherm 50 Series
PPG	Hi-Temp 500
Carboline	Carbozinc 11; Finish: Thermaline 4700 Series (up to 1000 deg F); Thermaline 4900 (up to 450 deg F)

Type K- Epoxy Concrete Coating	
Manufacturer	Approved Coating
Tnemec	Series 46H-413 Hi-Build Tneme-Tar
Sherwin-Williams	Tar Guard Epoxy
Akzo Nobel / International Paint, LLC	Interzone 954
Devoe Coatings	Devtar 5A Series
PPG	Amercoat 78HB Coal Tar Epoxy
Carboline	Bitumastic 300M

Note to Specifier: If Project includes bulk storage areas for chemicals, coordinate with coating manufacturers to verify the coating will protect the concrete based on what is being stored. The products listed in the table below are typical.

Type L - Novolac Vinyl Ester/Novolac Epoxy Concrete Coating - High Friction Surface (HFS)	
Manufacturer	Approved Coating
Tnemec	Series G436 Perma-Shield / Chembloc Series 252SC
Sherwin Williams	Dura-Plate 8200
Akzo Nobel / International Paint, LLC	Ceilmate 380 / 242GF Flakeline System
PPG	SFT 675 / FlakeRez 8303
Carboline	Carboguard 510 Series / Plasite 4500 Series

Type M - High Solids Epoxy Siloxane	
Manufacturer	Approved Coating
Carboline	Carboxane 2000
Sherwin-Williams	Sher-Loxane 800
PPG	PSX 700 Polysiloxane

Type N - Epoxy Mastic	
Manufacturer	Approved Coating
Carboline	Carbomastic 15
Sherwin-Williams	Macropoxy 646 Epoxy
PPG	Amerlock 2/400 AL
Tnemec	Chembuild Series 135 or Series 133 ProTuff
AkzoNobel/International Paint, LLC	Interseal 670HS

Type O - Elastomeric Polyurethane Hybrid	
Manufacturer	Approved Coating
Carboline	Reactamine 760 Series
Sherwin-Williams	Poly-Cote 115
PPG	Amerthane 490
Tnemec	Elasto-Shield Series 406
AkzoNobel/International Paint, LLC	Polibrid 705E Elastomeric

Type P - Glass Flake Reinforced Epoxy	
Manufacturer	Approved Coating
Carboline	Carboguard 890GF
Sherwin-Williams	Sher-Glass FF
PPG	Amerlock 2/400 GF
Tnemec	Pre-Approved Equal Glass Filled Product
AkzoNobel/International Paint, LLC	Approved Equal

Type Q - 100 Percent Solids Epoxy for Wastewater	
Manufacturer	Approved Coating
Carboline	Plasite 4550-S Novolac Epoxy
Sherwin-Williams	Dura-Plate 6000 Amine Epoxy
PPG	Novaguard 890 or Novaguard 810 Novolac Epoxy
Tnemec	Perma-Glaze Series G435 or Series G436 Modified Polyamine Epoxy

B. AWWA C210 Liquid-Epoxy Coatings and Linings for Water Pipe and Fittings

1. Line the piping with a liquid epoxy lining in accordance with AWWA C210, with a total thickness of 16 mils minimum DFT. Lining must be factory/shop applied. Install flanged and coupling connections as required to field install and prevent damaging the interior lining by welding as approved by the Engineer.
2. All lining materials must meet the applicable requirements of NSF/ANSI/CAN 600 according to the requirements of NSF/ANSI/CAN 61, including the most current health effects criteria for xylenes, toluene and ethylbenzene for the pipe diameter for which it is being applied.
3. Manufacturer must provide documentation that the product submitted is approved for the diameter of pipe in which it will be applied.
4. Approved Manufacturers:
 - i. 3M Scotchkote
 - ii. Carboline.
 - iii. PPG.
 - iv. Tnemec Company, Inc.
 - v. Sherwin-Williams Company.

E. Petrolatum (Wax) Tape:

5. Petrolatum (wax) tape must be installed per the manufacturer's written recommendations. Provide all primers and appurtenant materials as required for installation per the recommendations.
6. Approved Manufacturers:
 - i. Trenton Corp. - Trenton Primer and #1 Wax-Tape.
 - ii. Denso North America, Inc. - Denso Paste and Densyl Tape.
 - iii. Approved equal.

F. Pipe Wrap Tape System:

1. System must be designed to mechanically protect coated piping from corrosion and abrasion in above ground, below ground and submerged conditions and be compatible with specified pipe coating system(s).
2. System must be UV resistant and may be constructed of HDPE, PVC, or fiberglass with an adhesive backing on one side for application to coated piping.
3. System must include a fiberglass reinforced outer shield for abrasion resistance and be able to be top coated for aesthetics.
4. Approved Manufacturers:
 - i. SealForLife.
 - ii. Denso North America, Inc.
 - iii. Approved equal.

- G. Cold Galvanizing Compound:
1. Cold galvanizing compounds must meet the performance requirements of ASTM A780 and SSPC Paint 20. Cold galvanizing compounds are to be used for repair of damaged or corroding galvanized coatings. Cleaning and surface preparation is to be as indicated by the manufacturer. 95% zinc by weight, minimum.
 2. Approved Manufacturers:
 - i. Rust-Oleum – 7000 System Cold Galvanizing Compound.
 - ii. ZRC – Galvanizing Compound.
 - iii. Approved Equal.

530.8 Color Selection

- A. The color chart must include the complete available range of colors, including tints and shades. Owner will select the colors during construction.
- B. Use a multi-color system coating for any surface receiving more than one coat. Each coat must be tinted differently from the preceding coat in a manner that will allow the various coats to be easily distinguished. Colors must generally be from light to dark shades, but the Contractor may have the option to select tint shades to ensure coats will receive adequate coverage without bleeding or otherwise showing through the preceding coat.
- C. Piping and equipment must be color coded in accordance with the requirements of the TCEQ.

530.9 Delivery and Storage

- A. Deliver coating products to the jobsite in original unopened containers, with manufacturer's label and batch number attached. Do not apply products until the Owner's field representative has approved the product for use.
- B. Use one location at each jobsite for the storage of coating products. Protect the floor from spills and other damage. Protect the products from extreme heat or cold. Keep containers covered. Keep the storage rooms clean of trash and debris. Dispose of oily or used rags daily. Under no circumstances will they be allowed to accumulate. Take precautions to prevent fires. The storage of flammable liquids must comply with the city, state, or other fire codes.
- C. Storage of coatings and other products must be in accordance with the manufacturer's requirements. Coatings that have been damaged or not stored properly must not be applied and must be removed from the jobsite.
- D. All products and coatings that are not approved for the Project must be removed from the jobsite and must not be stored at the jobsite.
- E. All materials must be delivered to the jobsite in original sealed containers with the date of manufacture and batch number stamped thereon by the coating manufacturer. Materials are subject to random observations by the Owner's representative at the jobsite.

530.10 Construction Methods**A. General**

1. All coatings must be applied in strict conformance with the coating manufacturer's published specifications, this Section, or as approved by the Engineer.
2. Surfaces which will be inaccessible after installation must be coated prior to installation or must be coated and approved in stages as the Work is installed.
3. Engineer will approve surfaces for application of coatings at each stage. Any material that is coated prior to the Engineer's approval will be stripped back to bare metal and repainted.
4. At least 7 days or as required by the coating manufacturer, must be allowed for drying of finished surfaces before any machinery can be placed into service.
5. The number of coats called for in this Section are considered the minimum required. If more coats are required to provide the specified dry film thickness or for complete coverage and uniform appearance, they must be provided at no additional cost to the Owner.
6. Illumination equipment must be provided by the Contractor in accordance with SSPC Guide 12. Explosion-proof lights and electrical equipment must be provided. The minimum illumination at the surface of the work during surface preparation and coatings is 215 lux (20 fc). The minimum illumination during inspection is 538 lux (50 fc). Whenever required by the Owner's representative, the Contractor must provide additional illumination and necessary supports to cover all areas to be inspected.

B. Steel Surface Preparation

1. The adequacy of the preparation of steel surfaces will be determined by comparing the surface with SSPC VIS 1 "Pictorial Surface Preparation Standards for Painting Steel Surfaces" and SSPC VIS 3 "Guide and Reference Photographs for Steel Surfaces Prepared by Power and Hand Tool Cleaning." Prepare surfaces in accordance with the following requirements:
 - a. SSPC-SP 1 — Solvent Cleaning.
 - b. SSPC-SP 2 — Hand Tool Cleaning.
 - c. SSPC-SP 3 — Power Tool Cleaning.
 - d. SSPC-SP 5 / NACE 1 — White Metal Blast Cleaning.
 - e. SSPC-SP 6 / NACE 3 — Commercial Blast Cleaning.
 - f. SSPC-SP 7 / NACE 4 — Brush-Off Blast Cleaning.
 - g. SSPC-SP 10 / NACE 2 — Near-White Blast Cleaning.
 - h. SSPC-SP 11 — Power Tool Cleaning to Bare Metal.
2. The resulting surface profile must be in accordance with the coating manufacturer's recommendations.
3. "Solvent Cleaning" must be performed prior to subsequent surface preparation, including abrasive blast cleaning.

4. All sharp edges and welds must be ground smooth to a rounded contour and all weld splatter must be removed prior to abrasive blasting. Edges of metal to be coated must be rounded to a minimum of 1/16-inch radius of chamfered a minimum of 1/16 inch at an angle of 45 degrees.
 5. Welds and adjacent areas:
 - a. Prepared such that there is:
 - I. No undercutting or reverse ridges on the weld bead.
 - II. No weld spatter on or adjacent to the weld or any other area to be painted.
 - III. No sharp peaks or ridges along the weld bead.
 - IV. Grind embedded pieces of electrode or wire flush with the adjacent surface of the weld bead.
 - b. Weld profiles must conform to NACE RP0178, Profile 'D'.
- C. Ductile Iron Pipe and Fittings Surface Preparation
1. Prepare surfaces in accordance with the following requirements:
 - a. NAPF 500-03-01 — Solvent Cleaning.
 - b. NAPF 500-03-02 — Hand Tool Cleaning.
 - c. NAPF 500-03-03 — Power Tool Cleaning.
 - d. NAPF 500-03-04 — Abrasive Blast Cleaning for Ductile Iron Pipe.
 - e. NAPF 500-03-05 — Abrasive Blast Cleaning for Cast Ductile Iron Fittings.
 2. "Solvent Cleaning" must be performed prior to subsequent surface preparation as specified in NAPF 500-03.
- D. Petrolatum (Wax) Tape
1. Petrolatum (wax) tape must be installed per the manufacturer's written recommendations. Provide all primers and appurtenant materials as required for installation per the recommendations.
 2. Tape must be installed on all buried flexible couplings and at locations indicated on the Drawings and as specified.
- E. Pipe Wrap Tape System
1. Tape must be installed per the manufacturer's written recommendations. Provide all primers and appurtenant materials as required for installation per the recommendations.
 2. Tape must be installed on all piping at the transition between above grade and below grade. Coat piping a minimum of 2 feet vertically above and below the ground surface.
 3. Paint wrap to match adjacent piping.
- F. Concrete Surface Preparation
1. The adequacy of the preparation of concrete surfaces will be determined by comparing the surface with ICRI Surface Finish Comparators. Prepare surfaces

in accordance with the following requirements and the coating manufacturer's recommendations:

- a. SSPC-SP 13 / NACE 6 — Surface Preparation of Concrete.
 - b. ICRI CSP 3 – 5, or as required by the coating manufacturer.
2. Allow a minimum of 28 days curing time to elapse before coatings are applied. Concrete surfaces which are scheduled to receive coatings must be in accordance with the coating manufacturer's moisture requirements. Contractor must provide any primers required by the coating manufacturer to address outgassing, as needed.
 3. Contractor must field verify that the pH of the concrete is suitable for application per the coating manufacturer's product requirements.
 4. Bug holes, air pockets, voids or imperfections in the concrete surface must be filled or patched with a cementitious resurfacing material approved by the coating manufacturer.
 5. All coating terminations points, including from concrete to metal are to include a 1/4-inch key cut.
 6. Concrete Surface Preparation Inspection:
 - a. Adhesion Testing:
 - i. Tensile testing of the surface preparation must be performed by the Contractor using a Type 4 or Type 5 pneumatic adhesion testing equipment in accordance with ASTM D7234 using 2-inch diameter dollies for concrete surface adhesion testing. Provide a minimum of three tests (dollies) per area and coating system. Engineer will select location of test dollies.
 - ii. Concrete surface or applied coating must be scored for concrete adhesion testing.
 - iii. Adhesive failure greater than 50 percent of the dolly surface area indicate inadequate surface preparation.
 - iv. Cohesive failures which result in loss of sound concrete will be acceptable provided the loss is greater than 50 percent of the dolly surface area.
 - v. Low adhesion cohesive failures with a thin layer of concrete due to weak concrete or laitance over 50 percent of the dolly surface will be rejected.
 - b. Concrete Soundness: Concrete soundness will be determined using the scratching or hammer impact methods as defined in SSPC-SP 13.
 - c. Moisture Content: Moisture must be tested as specified in SSPC-SP 13 and in accordance with ASTM D4263 and ASTM F1869 (for conditioned spaces). Moisture content cannot exceed the moisture content recommended by the coating manufacturer.

G. Surface Preparation

1. Clean and degrease surfaces prior to abrasive blasting by solvent cleaning as specified using solvents, detergent/water, emulsions, and steam. Proposed

method must be documented in the coating plan. Contractor must contain and properly dispose of all runoff and debris from cleaning.

2. If the following conditions exist or are prevalent, surface preparation and coating must be delayed or postponed until conditions are favorable. Each day's coating must be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions or changes. No surface preparation can begin or coating applied:
 - a. When the surface, air or material is below or above the manufacturer's printed instructions.
 - b. When surfaces are wet or damp.
 - c. During weather conditions of rain, snow, fog or mist.
 - d. When the air and steel temperature is less than 5 deg F above the dew point temperature.
 - e. If the relative humidity is above 85 percent.
 - f. When it is expected that the dew point, air and/or surface temperature will be below or above the coating manufacturer's recommended temperatures within 4 hours after applications of coating, minimum. Coating manufacturer may require additional time between application and temperature and weather changes.
3. Shop Surface Preparation:
 - a. Notify Engineer at least 7 days prior to start of shop blast cleaning to allow for inspection of the Work during surface preparation and shop application of paints. Work is subject to the Engineer's approval before shipment to the jobsite.
 - b. Items such as structural steel, metal doors and frames, metal louvers, and similar items as reviewed and approved by the Engineer may be shop prepared and primed. Centrifugal wheel blast cleaning is an acceptable alternate to shop blast cleaning. Blast clean and prime in accordance with the Specifications.
 - c. Prepare surfaces by abrasive blasting as specified and apply shop prime coat. Shop primed steel plates must not have primer extended within 4 inches along all edges to be welded. All primer within 4 inches of an area to be welded must be removed prior to welding. Welding of painted surfaces will not be allowed.
4. All pre-assembled shop primed items must be prepared in accordance with these specifications and inspected by the Owner's representative before and after priming.
5. Abrasive Blasting:
 - a. Prior to commencing abrasive blasting operations, the Contractor must perform a test blast to verify that the surface cleanliness and profile meet the requirements of this Section and meet the coating manufacturer's requirements for the coating to be applied. If the test section does not meet the requirements, the Contract must make changes to the abrasive materials and/or methods to provide suitable blast.
 - b. Abrasive blast only the amount of surface area which can be primed the same day or before any rust starts to form, whichever occurs first. Areas which are

- not painted the same day must be re-blasted on the day the prime coat is applied.
- c. Shrouding or recovery of all blast material will be mandatory during all exterior blasting.
 - d. Contractor must contain all waste and process discharge in accordance with the accepted methods for the process and materials that are in abatement.
 - e. Where abrasive blast cleaning will not remove or properly prepare metal surfaces, hand and/or power tool cleaning must be used to remove such conditions as weld splatter, laminations and radius-sharp edges. Hand tool or power tool must be used on areas less than 2 feet in diameter or smaller or on corners and edges.
 - f. All abrasive blast equipment must be equipped with, including but not limited to the following:
 - i. Noise reducing devices.
 - ii. Hose coupling safety devices.
 - iii. Electrical grounding devices.
 - iv. Moisture traps and filters.
 - v. Fresh air hoods for all blasters.
 - vi. "Dead Man" switches on all blast hoses.
 - vii. Air dryers.
6. Surface profile must be in accordance with manufacturer's printed requirements.
 7. The adequacy of the preparation of surfaces must be determined by comparing the surface with SSPC-VIS 1, SSPC-VIS 3, NACE RP0178 and ICRI Surface Finish Comparators.
 8. Adequate surface preparation must be verified throughout surface preparation per SSPC-PA 17. Minimum testing requirements:
 - a. Test the surface profile within the first 15 minutes and one additional time during each work shift or 12-hour period, whichever is shorter for each gun or blasting apparatus used or at any time the process producing the acceptable profile indicated above is changed, as interpreted by the Engineer.
 - b. Select a minimum of three 6-inch square locations and take two readings. The average to the two readings is a "profile measurement." The group of three locations is the "location average." The location average must be within the specified profile range.
 - c. Contractor must report the location averages (lowest location average and highest location average, and the profile measurement for each surface preparation apparatus.
 - d. If the substrate has been previously coated, an existing profile may exist. Contractor must adjust blast media size to ensure that the resulting surface profile meets the profile required.
 9. Wherever the words "solvent cleaning", "hand tool cleaning", "wire brushing", or "blast cleaning", or similar words of equal intent are used in the Specifications or

in paint manufacturer's specifications, they are understood to refer to the applicable specifications indicated.

10. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacuum-blasting methods may be required. Coating manufacturer's recommendations for wet blast additives and first coat application will apply.
11. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wiped with a tack cloth.

H. Preparation Of Existing Coated Or Shop Primed Surfaces

1. General:

- a. Factory-applied primers to equipment must be those specified or verified by the Contractor to be compatible with the specified coating systems. Where possible, notify manufacturers which shop prime coats will be required in order to be compatible with field-applied finish coats.
- b. Where equipment is purchased which has the manufacturer's standard primer or a factory finish which is other than as specified in this Section, remove the factory-applied paint system or apply passivators or other special coatings as required to make the surface compatible with the finish coat specified.
- c. Do not apply any coating to machinery, piping, or other surfaces before testing has been completed and systems approved. Any damage to coatings resulting from subsequent corrective procedures must be stripped back to bare metal and repainted with the appropriate paint system as directed by the Engineer.
- d. Check for compatibility when applying coatings over existing coatings. Apply a test patch of the recommended coating system, covering at least 2 to 3 square feet or as directed by the Engineer. Allow to cure 1 week before testing adhesion per ASTM D3359 in the presence of the Engineer. If adhesion does not meet the manufacturer's published data, consult with the Engineer.
- e. Shop primed or coated surfaces must be reviewed with the Engineer to determine if the extent of damage to the coating and suitability of finish coats to adhere to shop applied coats.
- f. If a cured epoxy, polyurethane, or plural-component material is to be top coated provide brush-off blast as specified herein or as recommended by the coating manufacturer.
- g. Surface preparation recommendations of coating manufacturer are subject to approval of the Engineer.

2. To Be Recoated or Final Coated:

- a. Solvent clean.
- b. Perform touch-up repairs of existing coating.
- c. Asphaltic coated ductile iron pipe will require an application of a seal coat prior to the application of a cosmetic finish coat.

3. Touch-Up Repairs:
 - a. Clean loose, abraded, or damaged coatings to substrate by power tool to bare metal per SSPC-SP 11 and/or NAPF 500-03-03 "Power Tool Cleaning."
 - b. Feather surrounding intact coating.
 - c. Apply one spot coat of the specified primer to bare areas overlapping the prepared existing coating.
 - d. Apply one full finish coat of the specified primer or finish coat(s) overall.
4. Application of a Cosmetic Coat:
 - a. The exact nature of shop-applied coatings is not known in all cases.
 - b. Check compatibility by application to a small area prior to starting the coating.
 - c. If lifting or other problems occur, request disposition from the Engineer.

530.11 Application

- A. Contractor and painting technicians are responsible for the application of the coating system and must have current applicator approvals from the coating manufacturer, as required.
- B. After abrasive blast cleaning, dust and spent abrasive must be removed from the surfaces by vacuum process or with clean, dry, oil-free compressed air.
- C. The prime coat must be applied as soon as possible after the blasting and surface cleaning is completed, inspected and approved by the Inspector. Blasted surfaces must be coated before rust forms on the surface. No prepared surface will be allowed to receive a coating if "rust bloom" or surface discoloration has occurred. All blasted surfaces must be coated to within 6 inches of the edge of a blasted area. No visible rust must be coated under any circumstances, including rust bloom or if discoloration has occurred, regardless of elapsed time between blasting and coating. Leave an uncoated strip of exposed metal to clearly identify where abrasive blasting was halted.
- D. Provide mist coat if recommended by the coating manufacturer.
- E. All weld seams, gaps, edges, bolts and difficult areas to coat must receive a stripe coat. Stripe coat must be a contrasting color. Stripe coat may be applied with intermediate or finish coating, but must be applied prior to the installation of the finish coat.
- F. Contractor must apply each coat at the rate and in the manner specified by the coating manufacturer, except as may be modified herein. If material has thickened or must be diluted for application, coating must be built up to achieve the dry film thickness as specified for each coat of the complete system.
- G. Maximum and minimum DFT must be per the supplied coating manufacturer's printed requirements and as required by this Section. DFT will be measured per SSPC-PA 2, Level 2 with an allowable measurement of spot DFT of:
 1. Minimum DFT, as specified.
 2. 120 percent of maximum DFT specified.

- H. Contractor and painting technicians are responsible for the application of coating system and must have current applicator certifications from the coating manufacturer. Submit certifications with coating submittal.
- I. Coatings which have an expired shelf or pot life may not be used and must be removed from the jobsite.
- J. Coating must be applied by skilled workmen and must be brushed out or sprayed evenly, without runs, crazing, sags, or other blemishes.
- K. Sand between coats to remove over spray and dry fall.
- L. Apply the first coat to the surface, including cutting in around edges, before the second coat is applied. The second coat and any successive coats must not to be applied before notifying the Owner's field representative and obtaining approval. Each coat must be tested before the successive coat is applied.
- M. The coating curing period must be adjusted to compensate for less than adequate weather conditions, as recommended by the coating manufacturer, for complete curing of the entire coating system. The full curing time recommended by the manufacturer must be provided.
- N. Coating must be continuous and must be accomplished in an orderly manner to facilitate proper inspection control.
- O. Where a roller or brush is used to apply the coating, additional coats may be necessary to achieve the recommended dry film thickness and/or to achieve total coverage of the underlying surface. Coated surfaces must be totally free of all roller nap, roller marks, brush bristles and brush marks.
- P. When using conventional coating spray equipment for coating operations, effective oil and water separators combined with after coolers or deliquescent dryers must be used in compressed air lines to remove detrimental oil and moisture from the air. Separators must be placed as far as practical from the compressor. Compressors must be tested periodically by the Contractor for oil and water contamination of compressed air. Testing must follow ASTM D4285 "Standard Test Method of Indicating Oil and Water in Compressed Air." All compressor units found to produce unacceptable amounts of oil and or water, as determined by results of ASTM D4285 test data must be replaced with a compressor that is acceptable.
- Q. For porous surfaces, such as concrete or masonry, a prime coat may be thinned to provide maximum penetration and adhesion. The type and amount of thinning must be determined by the coating manufacturer and is dependent on surface density and type of coating.
- R. Concrete and Steel Floors and Walks, including Bulk Storage Areas:
 - 1. Provide non-skid surface in walkway areas and on floors.
 - 2. Contractor is to include non-skid additive such as aluminum oxide to coatings or may use 50 mesh dry wash silica sand broadcasted into the film and back rolled to encapsulate as recommended by the coating manufacturer.
 - 3. Contractor is to provide a test area to confirm with Owner that the non-skid surface is adequate and consistent. Contractor must modify method or products used as required to provide an acceptable surface.

530.13 Field Quality Control

- A. Field Tests: Make wet film tests during painting operations to assure proper thicknesses of coating are being applied. After each coat has been applied, test the paint film thickness with a nondestructive, magnetic type thickness gauge. The total dry-film thickness for each coat must be per Paragraph [3.09.G]. Apply additional coats until the specified thickness is reached or exceeded.
- B. Holiday Testing:
 - 1. Holiday testing must be performed in accordance with NACE SP0188 or ASTM D5162 for steel substrates and ASTM D4787 for concrete substrates.
 - 2. Test the entire surface of coated steel and piping in moderate or severe environments, as determined by the Engineer, with a holiday detector. For thickness between 10 and 20 mils (250 to 500 microns) a non-sudsing type wetting agent, as recommended by the holiday detector manufacturer, must be added to the water prior to wetting the detector sponge.
 - 3. Holiday detect coatings in excess of 20 mils with high voltage holiday testers as recommended by the coating manufacturer.
 - 4. Mark and repair failures in accordance with the manufacturer's printed instructions, then retest failure areas. No failures or other irregularities will be permitted in the final coats. Areas containing holidays must be repaired until tests indicate no holidays.

530.14 Protection Of Surfaces Not To Be Painted

- A. Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted.
- B. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
- C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.
- D. Mask openings in motors to prevent paint and other materials from entering the motors.

530.15 Damaged Coatings, Pinholes, And Holidays

- A. Feather edges and repaired in accordance with the recommendations of the paint manufacturer.
- B. Repair fusion bonded coatings to be as recommended by the original applicator. Applicator must provide liquid repair kits for this purpose as recommended by the coating manufacturer.
- C. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.

530.16 Unsatisfactory Application

- A. If the item has an improper finish color, or insufficient film thickness, clean and topcoat surface with specified paint material to obtain the specified color and coverage. Obtain specific surface preparation information from the coating manufacturer.
- B. Hand or power sand visible areas of chipped, peeled, or abraded paint and feather the edges. Follow with primer and finish coat in accordance with the Specifications. Depending on the extent of repair and its appearance, a finish sanding and topcoat may be required.
- C. Evidence of runs, bridges, shiners, laps, or other imperfections are cause for rejection.
- D. Repair defects in coating system per written recommendations of coating manufacturer.
- E. Leave all staging up until the Engineer has inspected the surface or coating. Replace staging removed prior to approval by Engineer.

530.17 Coating Inspection

General:

- A. All coats will be subject to inspection by the Engineer and the coating manufacturer's representative.
- B. Visually inspect concrete, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.
- C. Give particular attention to edges, angles, flanges, and other areas where insufficient film thicknesses are likely to be present and ensure proper millage in these areas.

Coating Thickness Testing:

- A. Owner's representative may conduct coating thickness testing as necessary and without limitation.
- B. Measure coating thickness specified in mils with an electronic type dry film thickness gauge.
- C. Check each coat for the correct millage.
- D. Tests for concrete coating thickness may be taken using a Tooke Gauge or gauge approved for testing coatings over concrete substrates. Contractor must repair coating after thickness testing, if required.
- E. Coating Continuity (Holiday) Testing: Owner's representative will witness holiday testing performed by the Contractor.

Cleaning And Adjusting:

- A. Promptly remove trash and debris resulting from painting operation from the Site. Remove drop cloths, masking tapes and other protective coverings. Remove paint spills, splatters, overlap of paint from adjacent material and other defects. Spot paint nicks and other defects.
- B. Remove paint containers and waste products. Thoroughly clean paint storage rooms, removing spilled paint from walls and floors.

- C. Damages due to over spray on buildings, vehicles, trees, or other surfaces not specified to be painted would be the responsibility of the Contractor.

530.18 Schedule

- A. Protective coatings must be applied in accordance with the following paint schedule. If additional or alternate primers, etc. are recommended by the coating manufacturer for any of the coatings specified, they must be provided at no additional cost to the Owner to provide a complete and compatible coating system, as approved by the Engineer.

PROTECTIVE COATINGS PAINT SCHEDULE

System	Application	Surface Prep	Product Type	No. of Coats	DFT/Coat (mils)
No. 1	<p>Submerged Metal - Potable Water All metal surfaces new and existing below a plane 1 ft. above the maximum liquid surface, metal surfaces above the maximum liquid surface which are a part of the immersed equipment, concrete embedded surfaces of metallic items under submerged or buried conditions, such as wall pipes, pipes, wall or floor sleeves, access manholes, gate guides and thimbles, and structural steel. Not to be used for potable water storage tanks. All coatings must be NSF 61 certified.</p>	<p>SSPC-SP 1 SSPC-SP 10 NAPF 500-03-01 NAPF 500-03-04 NAPF 500-03-05</p>	TYPE H - Epoxy-Polyamide	1	4.0
			TYPE H - Stripe Coat TYPE H - Epoxy-Polyamide	2	4.0
Total Minimum Dry Film Thickness					12.0 mils
No. 2	<p>Above-Grade Interior/Exterior Steel and D.I. Piping Non-Immersion/Non-Corrosive Environment All metal surfaces new and existing, such as inside pump station buildings, exterior piping and valves, exterior structural steel, etc. Application Notes: 1. Proposed piping and valves may be provided with factory applied prime coat(s), with fusion bonded epoxy or Type H epoxy. For damaged factory applied coatings spot prime with Epoxy Mastic. Provide application of Type C and Type M coatings in the field. 2. Proposed Field Coated and Existing Previously Coated Piping and Valves: Prepare as indicated and provide full coat of Epoxy Mastic and continue with stripe, intermediate and top coat as indicated.</p>	<p>For New Piping and Valves: SSPC-SP 1 SSPC-SP 6 NAPF 500-03-01 NAPF 500-03-04 NAPF 500-03-05 For Previously Coated Piping and Valves: SSPC-SP 1 SSPC-SP 3 NAPF 500-03-01 NAPF 500-03-03</p>	TYPE N - Epoxy Mastic	1	5.0
			TYPE C - Penetrating Epoxy Pre-Primer TYPE M - Stripe Coat Type M - HS Epoxy Siloxane	1	2.0
Total Minimum Dry Film Thickness					12.0 mils
No. 3	<p>Concrete Floor Surfaces/Bulk Storage Areas of Chemical Storage Areas All new and existing interior concrete floors, such as inside pump station buildings and chemical storage</p>	<p>SSPC-SP 13 ICRI CSP 3-5</p>	<p>Primer - As Needed TYPE L - Epoxy/Vinyl Ester</p>	1	35 mils

System	Application	Surface Prep	Product Type	No. of Coats	DFT/Coat (mils)
	<p>areas. All coatings must include skid-resistant additives.</p> <p>Note to Specifier: <u>The specified coatings have been reviewed for resistance up to 12.5% sodium hypochlorite. Review chemical list below and modify as required. Include concentration for chemicals being stored.</u></p> <p>Coatings provided must be resistant to sodium hypochlorite (12.5%), liquid ammonium sulfate (XX%), hydrochloric acid and sodium chlorite (XX%).</p> <p>Application Notes: Provide epoxy primer as required by coating manufacturer to address outgassing and resurfacing as required.</p>				
Total Minimum Dry Film Thickness					35.0 mils
No. 5	<p>High-Temperature Surfaces Interior and exterior surfaces of surfaces with temperatures from 200 to 400 deg F.</p> <p>Note to Specifier: <u>List and describe high temperature surfaces to be coated. Prior to specifying epoxy, verify tolerance for temperature.</u></p>	SSPC-SP 1 SSPC-SP 10	TYPE J - Silicone Aluminum	2	1.0
Total Minimum Dry Film Thickness					2.0 mils
No. 6	<p>Above-Grade Interior and Exterior PVC Pipe Exterior surfaces PVC piping.</p>	SSPC-SP 1 Light Sanding	TYPE B - Epoxy-Polyamide Primer TYPE I - Aliphatic Polyurethane Enamel	1 1	3.0 3.0
Total Minimum Dry Film Thickness					6.0 mils
No. 7	<p>Metal Piping and Valves – Immersion in Wet Wells Moderate to Severe Environment (Non-Potable) Exterior/interior surfaces of submersed valves & pumps, penstocks, piping, sewer interceptors,</p>	SSPC-SP 1 SSPC-SP 6 NAPF 500-03-01 NAPF 500-03-04 NAPF 500-03-05	Type Q - 100% Solids Epoxy for Wastewater	1-2	40.0

System	Application	Surface Prep	Product Type	No. of Coats	DFT/Coat (mils)
	wastewater vessels, settling tanks and buried piping connecting to them for severe conditions with exposure to H2S gas, including wastewater digesters, etc. Application Notes: Coating may be applied in two coats, as recommended by the manufacturer.				
Total Minimum Dry Film Thickness					40.0 mils
No. 8	New and Existing Metal Piping and Valves within Vaults and Under Insulation Moderate to Severe Environment All metal surfaces new and existing that will be installed in areas where temporary submerged conditions can occur, such as within vaults and for piping and valves covered with insulation. Application Notes: 1. Proposed piping and valves may be provided with factory applied prime coat(s), with fusion bonded epoxy or Type H epoxy. For damaged factory applied coatings spot prime with Epoxy Mastic. Provide application of Type C and Type M coatings in the field. 2. Proposed Field Coated and Existing Previously Coated Piping and Valves: Prepare as indicated and provide full coat of Epoxy Mastic and continue with stripe, intermediate and top coat as indicated.	For New Piping and Valves: SSPC-SP1 SSPC-SP6 NAPF 500-03-01 NAPF 500-03-04 NAPF 500-03-05 For Previously Coated Piping and Valves: SSPC-SP1 SSPC-SP3 NAPF 500-03-01 NAPF 500-03-03	TYPE N – Epoxy Mastic TYPE C – Penetrating Epoxy Pre-Primer TYPE G - Stripe Coat TYPE G – Epoxy-Polyamide	1 1 2	4.0 2.0 4.0
Total Minimum Dry Film Thickness					12.0 mils

530.19 Measurement and Payment

There is no separate payment for the supply and installation of coatings on any construction or installation by the Contractor. The Contractor shall consider all labor, equipment, materials, time, incidentals, and other items required for installation of coatings subsidiary to the item for which they are part.

End