SECTION 09900

PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope

1. Field painting of all new non-prefinished items including surface preparation and surface protection
   a. Repair of shop painted surfaces damaged during shipment, handling or installation
   b. Field priming of all new surfaces that are not shop primed
   c. Field finishing of all shop primed surfaces
   d. Field finishing of all field primed surfaces
   e. Field painting of all existing surfaces indicated on the Drawings
2. Piping identification for both new and existing piping
3. Equipment identification

B. Additional Requirements Specified Elsewhere

1. Section 01340: Shop Drawings and Product Data
2. Section 01400: Quality Control
3. Section 01600: Materials and Equipment
4. Section 01730: Operating and Maintenance Data

C. Related Requirements Specified Elsewhere

1. Section 01600: Materials and Equipment
2. Section 04200: Unit Masonry
3. Section 05500: Metal Fabrication
4. Section 06100: Carpentry
5. Section 07900: Joint Sealants
6. Section 09251: Gypsum Wallboard
7. Division 11: Equipment

1.2 QUALITY ASSURANCE

A. Include on Label of Containers

1. Manufacturer's name
2. Type of paint
3. Manufacturer's stock number
4. Color
5. Instructions for reducing, where applicable
6. Label analysis
7. Federal specification number

B. Sampling of Material

1. Provide test samples at random from sealed containers stored on-site

C. Paints used in successive field coats by same manufacturer

D. Field coats should not damage shop-applied undercoats

1.3 SUBMITTALS

A. Furnish complete manufacturer's product data, certificates, test data

1. Label each paint submittal with paint type and intended use

B. Color Samples

1. Furnish color chips for color selection by Engineer
2. Prepare stained wood samples on type and quality of wood specified for use on project
3. Engineer will prepare color schedule after submittals. Contractor will provide colors in accordance with schedule. Selections by Engineer may exceed manufacturer's standard range of colors

C. Maintenance Data: Include in Materials and Finishes Manual

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials

1. Deliver sealed containers with labels legible and intact
2. Deliver to project site or segregate at source of supply in advance of need to allow for testing

B. Storage of Materials

1. Store only acceptable project materials on project site
2. Store in a suitable location, clean, dry, well-ventilated, protected from damage due to weather and construction operations
3. Restrict storage to paint materials and related equipment
4. Store at temperature above 40°F
5. Handle materials in accordance with all manufacturer's recommendations

1.5 JOB CONDITIONS

A. Environmental Requirements

1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied
2. Do not apply finish in areas where dust is being generated

3. Air and surface temperatures within those recommended by manufacturer for the coating being applied

B. Protection

1. Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently or not to be painted
2. Arrange work and protection to prevent overspray from reaching other structures or facilities on the project site and adjacent properties

PART 2 - PRODUCTS

2.1 GENERAL

A. Use product of single manufacturer for each of the coating systems for each type of surface (one source of material)

B. Use paint compatible with shop coating or primer for field coating of shop painted or primed surfaces. Types of painting systems must be submitted with submittals

C. Use only mercury-free, fume proof paint for intermediate and finish coats. Paint must be suitable for atmosphere containing hydrogen sulfide

D. Use only lead- and chromate-free paint or paint that does not cause discoloration in sewage plant atmosphere

E. Provide tie coats where recommended by manufacturer

2.2 PRIMERS AND PRETREATMENTS

A. Rust Inhibitive, Universal Type: Tnemec Series 37H-77, or equivalent

B. Coal Tar, Bitumastic: Tnemec Series 46-465 H.B. Tnemecol, or equivalent

C. Oil Vehicle for Wood: Fed. Spec. TT-P-25, Tnemec Series 10-99 White, Architectural Wood Primer, or equivalent

D. Catalyzed Epoxy: Tnemec Series N69 Hi-Build Epoxoline II, or equivalent

E. Concrete Block Filler: Tnemec Series 130 Envirofill, or equivalent

F. Wood Stain: Pratt & Lambert Oil Stain, Olympic, or equivalent

G. PVC Sealer: Fed. Spec. TT-P-650

H. Galvanized, Non-Ferrous: Tnemec Series 115 Uni-Bond DF, or equivalent

2.3 INTERMEDIATE AND FINISH COATS

A. Gloss Acrylic Enamel: Tnemec Series 1028 Enduratone, or equivalent

B. Semigloss Acrylic Enamel: Tnemec Series 1029 Enduratone, or equivalent

C. Coal Tar-Epoxy: Tnemec Series 46H-413 Hi-Build Tneme-Tar, or equivalent

D. Thixotropic Coal Tar: MIL-C-18480, Tnemec Series 46-465 H.B. Tnemecol, or equivalent

E. Latex Emulsion: Acrylic containing at least 50 percent by weight nonvolatile solids, Tnemec Series 6-Tneme-Cryl, or equivalent

F. Epoxy Coatings: Tnemec Series N69 Hi-Build Epoxoline II, Tnemec Series N69-15, or equivalent

G. Tile-Like Wall Finish: Fed. Spec. TT-C-550, Tnemec Series 84 Ceramlon, or equivalent

H. Clear Gloss Varnish: Cook Timbretone Satin Varnish, Martin Senour Astro-Var, Pratt & Lambert Varmor Clear Finish, Mobil 38-V-23 Clear Urethane Glass, or equivalent

I. Clear Satin Varnish: Cook Timbretone Satin Varnish, Pratt & Lambert 38 Satin Pale Trim Varnish, Martin Senour Astro-Var, or equivalent

J. Heat Resistant Aluminum: Rust-Oleum 473402 Heavy-Duty Aluminum, or equivalent

    1. Aluminum color not required subject to Engineer's acceptance of alternative

K. Heat Resistant Gray: Rust-Oleum 4285402 Gray Zinc-Sele®, or equivalent

L. Heat Resistant Black: Fed. Spec. TT-E-496, Rust-Oleum 4279402 Black, or equivalent

M. Heat Resistant Silicone: Fed. Spec. TT-P-28, Sherwin-Williams Kem Hi-Temp Heat Flex 11450, or equivalent

N. Exterior Wood Stain: Olympic Solid Color Stain, Sherwin-Williams Solid Color Exterior Stain, or equivalent

O. Asphalt Varnish: Fed. Spec TT-V-51

P. Acrylic – Eggshell: Tnemec Series 115 Uni-Bond DF, or equivalent

Q. Polyurea Elastomer: Sherwin-Williams EnviroLastic AR425, or equivalent

R. Polyurethane: Tnemec Series 1081 Endura-Shield, or equivalent

S. Exterior, exposed concrete surface: Thorocoat® Coarse, or equivalent

T. Exterior, Exposed Masonry: Tnemec Series 180 W.B. Tneme-Crete®, or equivalent

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence or quality of work and which cannot be put into an acceptable condition through preparatory work as included in Preparation of Surfaces

B. Do not proceed with surface preparation or coating application until conditions are suitable

3.2 PREPARATION OF SURFACES

A. Ferrous Metal Surfaces

1. Exterior, interior, non-immersion - all exposures: SSPC-SP6, Commercial Blast Cleaning
2. Immersion service: SSPC-CP10 Near White Blast Cleaning
3. High temperature surfaces to 1200°F: SSPC-SP10 Near White Blast Cleaning

B. Galvanized Metal

1. Prepare surface in accordance with recommendations of coating manufacturer
2. Pretreatments such as Henkel, Oakite may be required for galvanized surfaces in severe humid/wet environments
3. SSPC-SP1 solvent cleaning prior to pretreatment application

C. Wood

1. Clean soiled surfaces with alcohol wash
2. Except where rough exterior surface is specified, sand to smooth and even surface, then dust or vacuum off
3. Apply knot sealer to all knots, pitch and resinous sap wood before priming coat is applied
4. Fill nail holes, cracks, open joints, and other defects with wood filler or putty compatible with type of finish after priming coat has dried. Color to match finish color
5. Back prime wood trim prior to installation

D. Plaster and Gypsum Wallboard

1. Fill narrow, shallow cracks and small holes with spackling compound
2. Rake deep, wide cracks and deep holes
   a. Dampen with clear water

b. Plaster: Fill with thin layers of patching plaster
c. Gypsum wallboard: Fill with thin layer of drywall joint cement

3. Allow to dry
4. Sand Smooth: Do not raise nap of paper on wallboard

E. Concrete, Masonry, and Cement Stucco

1. Remove all dirt, dust, stains, and grease before painting
2. Fill cracks and irregularities with Portland cement grout to provide uniform surface texture
3. Etch with 25% solution (by weight) muriatic acid (horizontal surfaces only), rinse thoroughly
4. Fill concrete masonry unit surfaces with block filler, except interior surfaces to be painted with latex which do not need to be filled
5. Cure minimum of 28 days prior to coating
6. Level all fins and protrusions in CMU

F. Aluminum, Copper, PVC

1. Clean surface with mineral spirits where material will be in contact with concrete
2. Apply coal tar epoxy after cleaning and cure prior to placing concrete

G. Hardware

1. Remove any visible dirt, corrosion, or foreign material

H. Copper

1. Buff or polish to bright color
2. Remove flux residue from joints in copper tubing
3. Clean surface with mild phosphoric acid cleaner
4. Apply finish while surface is clean and bright

I. PVC Plastic

1. Remove all wax and oil with solvent in accordance with recommendations of primer manufacturer

3.3 MIXING AND TINTING

A. Deliver paints and enamels ready-mixed to job site

B. Mix only in mixing pails, suitable sized, non-ferrous or oxide metal pans

C. Use tinting colors recommended by manufacturer for specific type of finish

D. Materials shall be mixed, thinned, and applied according to the manufacturer's printed instructions

E. Thinning only permitted to obtain recommended coverage at lower application temperatures

F. Do not thin paint below recommended coverage rate

3.4 APPLICATION

A. General Requirements

1. Do not apply initial coating until moisture content of surface is within moisture limitations of paint manufacturer
2. Apply paint with suitable brushes, rollers or spraying equipment
   a. Rate of application shall not exceed that as recommended by paint manufacturer for the surface being finished
   b. Keep brushes, rollers and spraying equipment clean, dry, free from contaminants and suitable for the finish required
3. Comply with recommendation of product manufacturer for drying time between succeeding coats
4. Slightly vary the color of successive coats
5. Sand and dust between each coat to remove defects visible from a distance of five (5) feet
6. Finish coats shall be smooth, free of brush marks, streaks, laps or pile up of paints and skipped or missed areas
7. Inspection
   a. Do not apply additional coats until completed coat has been inspected by the Engineer
   b. Only inspected coats of paint will be considered in determining number of coats applied
8. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping
9. Leave all parts of moldings and ornaments clean and true to details with no undue amount of paint in corners or depressions
10. Apply primer on all work before glazing
11. Refinish whole wall where portion of finish has been damaged or is not acceptable
12. Application temperatures
    a. 35-50°F to 100°F for solvent (epoxy) based coatings
    b. 40°F to 100°F for all other paint
    c. In accordance with manufacturer's recommendations
13. Relative humidity: 85% maximum

B. Painted Work

1. Back prime all exterior woodwork with oil base primer
2. Back prime all interior trim
3. Runs on face not permitted

C. Stained and Natural Finish

1. Adjust natural finishes as necessary to obtain identical appearance on all woodwork of a similar type

D. Latex and Acrylic

1. Apply only by brushing or rolling, spraying allowed for overhead only

E. Film Thickness

1. Total dry film thickness including prime, intermediate and finish coats are included in the field painting schedule

3.5 CLEANING

A. Touch up and restore finish where damaged

B. Remove spilled, splashed or splattered paint from all surfaces

C. Do not mar surface finish of item being cleaned

D. Leave storage space clean and in condition required for equivalent spaces in project

3.6 FIELD PRIMING SCHEDULE

A. All surfaces for Equipment Not Shop Primed and Repair of Shop Priming

1. Alkyd enamel: Rust inhibitive primer
2. Aluminum paint: Rust inhibitive primer
3. Coal tar paint: Coal tar or same as finish coats
4. Coat tar epoxy: Coal tar epoxy

B. Steel and Cast Iron

1. Alkyd enamel: Rust inhibitive primer
2. Aluminum paint: Rust inhibitive primer
3. Epoxy coating: Catalyzed epoxy
4. Coal tar paint: Coal tar or same as finish coats

C. Galvanized: Pretreatment where required by paint manufacturer

D. Copper: Pretreatment where required by paint manufacturer

E. Stainless Steel: Pretreatment where required by paint manufacturer

F. PVC: Catalyzed epoxy

G. Wood: Oil vehicle for wood

H. Insulated: As recommended by manufacturer of finish coats

I. Concrete: As recommended by manufacturer

J. Concrete Block: Concrete block filler except for block with integral color

K. Tie Coat: As recommended by manufacturer of top coats

3.7 PAINTING SCHEDULE (Refer to Part 2 of this Section)

A. Metal Surfaces

1. All surfaces of structural and miscellaneous steel exposed in exterior and interior locations, except for chemical feed areas
   a. Primer, system 2.2.A: 2.0-3.5 mils dry film
   b. Finish coats: 2 total; each coat, system 2.3.A @ 1.5-2.5 mils dry film
2. All fully or partially submerged metal surfaces of screening, sludge collection, clarification, and grit removal equipment unless otherwise specified
   a. Primer, system 2.3.C: 7 mils dry film
   b. Finish coat, system 2.3.C: 7 mils dry film
   c. Total dry film thickness: 14.0 mils
3. All exposed surfaces of both new and existing cast iron and steel piping inside buildings and above grade outdoors including valves, fittings, flanges, bolts, supports, and accessories therefore and including galvanized surfaces
   a. Primer, system 2.2.A: 2.0-3.5 mils dry film
   b. Finish coat, system 2.3.A: 3-5 mils dry film
   c. Total dry film thickness: 5.0-8.5 mils
4. All exposed surfaces of electrical conduit inside buildings, except banks of conduits in multiple layers hung from ceilings including fittings, boxes, supports, and accessories
   a. Primer, system 2.2.A: 2.0-3.5 mils dry film
   b. Finish coats: 2 total, each coat, system 2.3.B @ 1.5-2.5 mils dry film each
   c. Total dry film thickness: 5.0-8.5 mils
5. All exposed surfaces, unless otherwise specified, which will be buried including valves, valve boxes, metal harness anchors, but excluding piping laid in the ground
   a. Primer, system 2.2.B: 10 mils dry film
   b. Finish coat: system 2.3.C: 10 mils dry film
   c. Total dry film thickness: 20 mils
6. All exterior surfaces of cast iron and steel piping exposed or submerged in manholes, wetwells and similar locations inducing valves, fittings, flanges, bolts, supports and accessories
   a. Primer: System 2.2.B: 7 mils dry film
   b. Finish coat: System 2.3.C: 7 mils dry film
   c. Total dry film thickness: 14 mils
7. All miscellaneous metal exposed in the chemical feed areas
   a. Primer: System 2.2.D: 7 mils dry film

b. Finish coat: System 2.3.F: 7 mils dry film
c. Total dry film thickness: 14 mils

8. All miscellaneous castings including M.H. rings, covers, and steps not foundry dipped
   a. Primer, system 2.2.B: 10 mils dry film
   b. Finish coat, system 2.3.C: 10 mils dry film
   c. Total dry film thickness: 20 mils
9. All exposed surfaces of aluminum and galvanized duct work
   a. Primer, system 2.2.H: 2.0-4.0 mils dry film
   b. Finish coat, system 2.3.Q: 1 coat, 2.0-4.0 mils dry film
   c. Total dry film thickness: 4.0-6.0 mils
10. Copper tubing including fittings and valves
    a. Primer, system 2.2.D: 0.3-0.5 mils dry film
    b. Finish coats: 2 coats, each coat, system 2.3.A @ 1.5-2.5 mils dry film each
    c. Total dry film thickness: 3.3-5.3 mils
11. Polished brass or bronze
    a. Primer and finish coats: System 2.3.I: 2 coats total, 2 mils dry film
12. All surfaces subject to extreme heat including engine exhaust piping
    a. Primer and finish coats, system 2.3.J through 2.3.L: 2 coats @1.5-3 mils dry film thickness total
13. All metal harness anchorage for buried piping
    a. Primer, system 2.3.D: 20 mils dry film thickness
    b. Finish coat, system 2.3.D: 10 mils dry film thickness
    c. Total dry film thickness: 30 mils

B. Concrete and Masonry Surfaces

1. Interior walls of Headworks operating floor level from operating slab to 4' above slab
   a. Block filler: System 2.2.E
   b. Primer coat: None required
   c. Finish coats: System 2.3.Q
2. Where indicated on Drawings or specified: Section 07150 - Dampproofing
3. Where indicated on Drawings or specified
   a. Prime coat: System 2.2.D
   b. Finish coat: System 2.3.F
4. Exterior, exposed concrete surface
   a. Prime coat: System 2.2.I
   b. Finish coat: System 2.3.S: 8-11 mills dry film thickness
      1) Finished form surface preparation in accordance with Section 03300
      2) Color selection by Owner and Engineer
      3) Apply in accordance with Manufacturer's specifications
5. Exterior, exposed masonry
   a. Block filler: System 2.2.E
   b. Primer coat: none required
   c. Finish coats: System 2.3.T: 8-10 mils dry film thickness

C. Miscellaneous Surfaces

1. Gypsum and Keene's cement finish plaster surfaces: 2 coats, system 2.3.E

2. Wood shelves: 2 coats minimum clear satin varnish, system 2.3.I
3. Insulated piping: 2 coats minimum gloss, system 2.3.A
4. PVC piping: 2 coats minimum gloss alkyd enamel, system 2.3.A

3.8 SURFACES NOT TO BE PAINTED

A. Except as otherwise required or directed, do not paint the following surfaces

1. Exposed surfaces of aluminum, except ductwork or surfaces in contact with concrete
2. Polished or finished stainless steel; unfinished stainless steel shall be painted
3. Nickel or chromium
4. Galvanized surfaces, except piping, conduit, ductwork, and other items specifically noted
5. Piping concealed in inaccessible plumbing chases and above suspended ceilings
6. Rubber and plastics, including fiberglass reinforced plastics
7. Acoustical panel ceilings
8. Face brick
9. Exterior concrete except where otherwise specified on Drawings
10. Surfaces specified to be factory finished
11. Interior of precast concrete roof and walls
12. Cast-in-place columns and beams
13. Unit masonry with integral color

3.9 PIPING

A. Paint all new and existing exposed piping and piping in accessible chases in accordance with color schedule included below

B. Paint any piping, not scheduled to be color coded, to match adjacent wall or ceiling surface include appropriate service identification and flow direction arrows

C. Do not paint uninsulated stainless steel pipe or PVC pipe; for color coding, use bands of specified color on top of pipe

D. Locate lettering and flow direction arrows near equipment served, adjacent to valves and hose bibs, both sides of walls and floors where pipe passes through, at each branch or tee, and at intervals of not less than 50' in straight runs of pipe

E. Provide metal tags instead of lettering for all pipes with outside diameter or pipe covering diameter 5/8" or smaller. Tags are to be of stainless steel or aluminum with identifying lettering stamped in and fastened to pipe with suitable chains

3.10 PAINTING COLOR SCHEDULE

A. Piping Schedule

Letters	Color of Pipe	Color of Letters
Potable Water (hot or cold)	Light Blue	Black
Non-Potable Water	Dark Blue with White Bands	White
Seal Water	Dark Blue with red Bands	White
Compressed Air	Light Green	Black
Laboratory Vacuum	Dark Green with light green bands	Red
Vacuum Pump	Aluminum	Black
Discharge Natural Gas	Red	White
Sludge Gas	Red with black bands	Black
Sewage	Light Gray	Black
Sump Pump Discharge	Light Gray	Black
Primary Sludge and Scum	Dark Brown	White
Return Sludge	Light Brown	White
Waste Activated Sludge & Final Scum	Dark Brown with yellow bands	White
Digester Supernatent	Light Gray	Black
Digested Sludge	Dark Brown with yellow bands	White
Drain	Dark Gray	White
Chlorine (gas liquid or vent)	Yellow	Black
Chlorine (solution)	Yellow with red bands	Black

B. Paint electrical conduit to match adjacent ceiling or wall surfaces as directed by the Engineer. Paint vent lines to match surfaces they adjoin

C. Special painting of the following will be required

Item	Color
Valve handwheels and levers	Red
Hoist hooks and blocks	Yellow and black stripes

3.11 IDENTIFICATION

A. Lettering

1. Paint, stencil, or use snap-on markers
2. Letter size as follows

Outside Diameter of Pipe or Covering	Minimum Height of Letters
⅝" or smaller	Metal tags - ¼"
¾" through 4"	¾"
5" or larger	2"

B. Scheduled Color Coding

1. All 24" pipe and smaller
2. Bands where scheduled: 6" wide at 5' intervals

C. Piping Not Scheduled

1. Paint to match wall or ceiling, unless otherwise directed by Engineer
2. Appropriately identify and place flow arrows
3. Uninsulated stainless steel and PVC
   a. Natural finish
   b. Color bands where scheduled

D. Equipment Identification Nameplate

1. Mount on all pieces of equipment to identify its function
   a. All new valves in exposed service
   b. All existing valves
   c. All pieces of equipment
2. Designations correspond to those shown on drawings
3. Embossed aluminum
4. 1" by 3" minimum
5. Letters 3/16" high minimum
6. Mounted directly on or adjacent to each piece of equipment

E. Nonpotable Water Supply System

1. Provide 10" x 14" minimum caution signs to read "CAUTION – NONPOTABLE WATER SUPPLY", unless otherwise directed on the Drawings
2. Attach directly on or adjacent to all hose bibs and yard hydrants

END OF SECTION