

DIVISION 9

FINISHES

090000 GENERAL

The Contractor shall furnish all labor, materials, and equipment necessary to do all the work specified or required by these Specifications or the Plans. All materials specified by name, brand, or manufacturer, or selected for use under these Specifications, shall be delivered unopened at the jobsite in their original containers bearing the manufacturer's label. No material other than that specified or approved shall be delivered, stored, or kept at the jobsite.

090100 PAINTING - GENERAL

- A. No lead paints shall be used.
- B. All paint for concrete and metal surfaces shall be especially adapted for use around wastewater treatment plants and shall be applied in conformance with the manufacturer's published specifications.
- C. All paint for final coats shall be fume resistant, compounded with pigments suitable for exposure to sewage gases, especially to hydrogen sulfide and to carbon dioxide. Pigments shall be materials which do not tend to darken, discolor, or fade due to the action of sewage gases. If a paint manufacturer proposes use of paint which is not designated "fume resistant" in its literature, it shall furnish full information concerning the pigments used in this paint.
- D. Coatings used in conjunction with potable water supply systems shall have FDA approval for use with potable water and shall not impart a taste or odor to the water.
- E. Complete data on each type and kind of paint and primer shall be submitted to the Engineer for review. Review shall be received from the Engineer before the paint is delivered to the jobsite. This procedure shall be followed whether or not the paint that the contractor proposes to use is named in the Specifications. Review data shall show where and for what uses each paint product is proposed to be used with cross reference made to paragraphs of the Specifications or Painting Schedule. Data submitted on each proposed type and kind of paint shall include data to show that the paint meets the requirements of these Specifications.
- F. Paints not listed in the Specifications and which are submitted for review shall be submitted with a certified ingredients analysis. Data shall include sufficient information for making a complete comparison between specified and proposed paint.
- G. Colors shall be as specified or as selected by the Engineer. Colors will not necessarily be standard colors with all suppliers, and colors shall be mixed by the manufacturer to secure desired color when not standard. The Contractor shall prepare and submit color chip samples for all items which require color selection by the Engineer. If requested for special architectural finishes, the Contractor shall also submit 6-inch by 6-inch samples similar to the intended coated surfaces and coated with the selected color. No color selection will be made until all samples of all paints have been submitted. After all

samples of all paints have been submitted, the Engineer will prepare a color scheme using the submitted colors.

- H. All paint shall comply with all requirements of the Air Pollution Regulatory Acts concerning the application and formulation of paints and coatings for an area in which the paints are applied. Specifically, paints shall be reformulated as required to meet the local, State, and Federal requirements.
- I. At the end of the project, the Contractor shall turn over to the Engineer a gallon can of each type and color of paint, primer, thinner, or other coating used in the field painting. If the manufacturer packages the material concerned in gallon cans, then it shall be delivered in unopened labeled cans as it comes from the factory. If the manufacturer does not package the material in gallon cans, and in the case of special colors, the materials shall be delivered in new gallon containers, properly closed with typed labels indicating brand, type, color, etc. The manufacturer's literature describing the materials and giving directions for their use shall be furnished in three bound copies. A typewritten inventory list shall be furnished at the time of delivery.

090101 MANUFACTURERS' INSTRUCTIONS

The manufacturers' published instructions for use as a guide in specifying and applying the manufacturers' proposed paint shall be submitted to the Engineer. Paint shall not be delivered to the job before review of the manufacturer's instructions is given by the Engineer.

A manufacturer's paint will not be considered for review unless that manufacturer's published instructions meet the following requirements:

- A. The instructions must have been written and published by the manufacturer for the purpose and with the intent of giving complete instruction for the use and application of the proposed paint in the locality and for the conditions for which the paint is specified or shown to be applied under this Contract.
- B. All limitations, precautions, and requirements that may adversely affect the paint; that may cause unsatisfactory results after the painting application; or that may cause the paint not to serve the purpose for which it was intended, that is, to protect the covered material from corrosion, shall be clearly and completely stated in the instructions. These limitations and requirements shall, if they exist, include, but not be limited to the following list:
 - 1. Methods of application.
 - 2. Number of coats.
 - 3. Thickness of each coat.
 - 4. Total thickness.
 - 5. Drying time of each coat, including primer.
 - 6. Primer required to be used.

7. Primers not permitted.
8. Use of a primer.
9. Thinner and use of thinner.
10. Temperature limitations during application and after application.
11. Time allowed between coats.
12. Protection from sun.
13. Physical properties of paint including solids content and ingredient analysis.
14. Surface preparation.

Concrete surfaces specified by the paint manufacturer to be acid etched shall be etched in accordance with the manufacturer's instructions. The surface shall then be thoroughly scrubbed with clean water, rinsed, and allowed to dry. The surface shall be tested with a moisture meter to determine when dry before coating.

090102 SPECIFIED PRODUCTS LIST

<u>Brand Name</u>	<u>Manufacturer</u>
Amchem	Amchem Products Fremont, California
Amercoat	Ameron Corporation Brea, California
Borden	Borden Chemical Company 50 West Broad Street Columbus, Ohio 43215
Carboline	Carboline Company St. Louis, Missouri 63144
Glidden	Glidden Coatings and Resins Division of SCM Corporation Cleveland, Ohio 44115
Inertol and Ramuc	Koppers Company, Inc. Koppers Building Pittsburgh, Pennsylvania 15219

Koppers	Koppers Company, Inc. Koppers Building Pittsburgh, Pennsylvania 15219
Mobil	Mobil Chemical Company Maintenance and Marine Coatings Dept. Los Angeles, California 90054
NO-OX-ID	Dearborn Chemical Company 807 Mateo Street Los Angeles, California 90021
Porter	Porter Coatings Division of Porter Paint Company Louisville, Kentucky 40201
Sherwin-Williams	The Sherwin-Williams Company 101 Prospect Avenue, N.W. Cleveland, Ohio 44115
Tnemec	Tnemec Company, Inc. 123 West 23rd Avenue North Kansas City, Missouri 64116

090103 PREPARATION OF SURFACES

Paint surface preparation shall be as specified in the following or as recommended by the paint manufacturer's published application instructions, whichever imposes the most stringent requirements.

All surfaces to be painted shall be clean and dry except that in some cases the paint manufacturer's directions may require wetting the surface before painting.

Except as otherwise provided, all preparation of metal surfaces shall be in accordance with Specifications SP-1 through SP-10 of the Steel Structures Painting Council (SSPC). Where Steel Structures Painting Council Specifications are referred to in this specification, the corresponding Pictorial Surface Preparation Standard shall be used to define the minimum final surface conditions to be supplied. Grease and oil shall be removed by wiping with mineral spirits or naphtha per Specification SP-1. Rust, scale, welding slag, and spatter shall be removed and the surface prepared by hand tool cleaning, power tool cleaning or blast cleaning in accordance with the appropriate Specifications SP-2 through SP-10.

Unless otherwise specified, all iron or steel surfaces which are to be painted as submerged or high temperature metal shall be sandblasted on the site in accordance with Specification SP-10, near white blast cleaning or better. Sandblasting shall provide a roughened surface profile of not less than 2.0 mils in depth. Sandblasting shall be with abrasive Ottawa flint silica 30 to 50 mesh, Clemtex No. 2 silica 20 to 40 mesh, silica sand 20 to 40 mesh or steel grit mixed with shot. All metal surfaces which are to be painted as unsubmerged metal shall be commercial blast cleaned per Specification SP-6 except as otherwise specified, in locations where sandblasting would damage previously coated surfaces and installed equipment, and in

locations where dry sandblasting is prohibited. The above locations in which SP-6 commercial sandblasting is not possible shall be given a SP-3 power tool cleaning. This sandblasting shall be done not more than 12 hours ahead of the painting, subject to humidity and weather conditions between the time of sandblasting and painting operations. If any rusting or discoloration of sandblasted surfaces occurs before painting, such rusting or discoloration shall be removed by additional sandblasting. Sandblasted surfaces shall not be left overnight before painting. No surface which is to be sandblasted shall be given a coat of primer or paint in the shop or in the field before sandblasting.

Surfaces to be painted at erection welds, surfaces exposed by damage to the coating, as during erections, shall be cleaned as above before painting.

Threaded portions of valve and gate stems, machined surfaces which are intended for sliding contact, surfaces which are to be assembled against gaskets, surfaces or shafting on which sprockets are to fit, or which are intended to fit into bearings, machined surfaces of bronze trim on slide gates and similar surfaces shall be masked off to protect them from the sandblasting of adjacent surfaces. Cadmium-plated items shall not be sandblasted except that cadmium-plated, zinc-plated, or sherardized fasteners used in assembly of equipment to be sandblasted shall be sandblasted in the same manner as the unprotected metal. Galvanized items shall not be sandblasted except when painting of such items is indicated on the Plans or specified. All installed equipment, mechanical drives, and adjacent painted equipment shall be protected from sandblasting. Protection shall prevent any sand or dust from entering the mechanical drive units or equipment where damage could be caused.

There will be some surfaces which cannot be sandblasted, or which cannot be sandblasted and painted, after the items of which they are a part have been assembled in final position. These surfaces shall be sandblasted, or sandblasted and painted, before the items are put into final position. In some cases while the painting could be done after the items concerned were in place, the limitation on time between sandblasting and painting may make it necessary to paint the surfaces before installation of the items concerned.

Sand from sandblasting shall be thoroughly removed, using a vacuum cleaner if necessary. No surface which has been sandblasted shall be painted until inspected by the Engineer.

All concrete to be painted or coated shall be prepared as specified in DIVISION 3, CONCRETE.

Concrete and masonry surfaces shall be free of dust, mortar droppings and spatter, fins, loose concrete particles, form release materials, oil, grease, and other deleterious materials. If required by the coating manufacturer, such surfaces shall be etched as specified above or brush-off blast cleaned.

Wood surfaces to be painted shall be cleaned of dirt, oil, or other foreign substances with mineral spirits, scrapers, sandpaper or wire brushes. Sandpaper any roughness after first prime coat. Wood shall be cleaned and dusted before painting. Shelves, drawers, benches, and associated woodwork shall be sanded before painting and lightly sanded between coats. All knots and sappy places shall be coated with liquid shellac of not over two pound cut after the priming coat has been applied and dried. Nail holes, cracks, open joints and other defects in all interior woodwork shall be filled with putty colored to match the finish coats after the priming coat has been applied and is dry.

All painted surfaces shall be dusted between coats and high gloss finishes shall be lightly sanded and dusted between coats unless otherwise directed by the manufacturer.

Surfaces which are to be painted with other than bituminous paint and which have had a bituminous coating (such as coal-tar varnished pipe), shall be sealed with not less than two coats of Inertol Tar Stop, Sherwin-Williams Metalatex B-42 W100, Glidden Insulcap, or equal, in sufficient quantity to permanently prevent bleeding of the bituminous coating.

Galvanized surfaces which are to be painted shall first be treated with Koppers No. 40 Metal Conditioner, Amercoat No. 59, Galvaprep No. 5 as manufactured by Amchem Products, or equal. Pretreatment for galvanized metal shall be applied not more than 48 hours prior to coating.

All fiberglass to be painted shall be lightly sandblasted or sanded to roughen surfaces just prior to painting.

Plastic surfaces shall be solvent-washed to dull the surface, using a vinyl thinner approved by the finish coating manufacturer.

Aluminum, copper, and other metal surfaces shall be lightly sanded or receive surface preparation as specified in the following or as recommended by the paint manufacturer.

090104 APPLICATION OF PAINT

The applicator of the paint shall have had past experience in applying the type or types of coatings and under similar conditions that he will be required to meet in this Contract. The Contractor shall verify the paint applicator's qualifications and past performance before subcontracting the work to him.

No painting shall be done under dusty conditions, during or immediately after a rain, during rainy weather, when the ambient and/or surface temperature is less than 50 degrees, or when the temperature exceeds that recommended for application by the paint manufacturer. Relative humidity shall be between 30 and 85 percent and the dew point shall not be within 5 degrees of the surface temperature.

Paint may be applied by brush, roller, trowel, or spray, unless the manufacturer's recommendations or these Specifications call for some particular type of application. Where spray application is used, each coat of paint shall be applied to a thickness equivalent to a brush coat application at a coverage not greater than that specified by the manufacturer for a brush coat application. All spray painting shall be by the airless method except where specifically allowed by the Engineer for architectural painting. All air spray units shall have operable line filters for removal of all oil and moisture. The Contractor shall demonstrate the efficiency of the line filters before applying any paint.

Spray painting shall be conducted under controlled conditions and the Contractor shall be fully responsible for any damage to adjacent work or adjoining property occurring from spray painting.

All work shall be done leaving the finished surfaces free from drops, ridges, waves, holidays, laps, or brush marks. Drop cloths and other coverings shall be so placed at all times as to protect floors, other surfaces, and equipment from spatter and droppings. Hardware, plates, lighting fixtures, nameplates, and similar articles which are not to be painted shall be masked off or removed completely. After completion of painting, any spatter or droppings shall be removed.

Primer and intermediate coats of paint shall be unscarred and completely integral at the time of application of each succeeding coat. Each coat shall be subject to the inspection and approval of the Engineer before

the next succeeding coat is applied, and defective work of any kind shall be deemed sufficient cause for stripping, removal, and reparing if required by the Engineer followed by recoating the entire surface involved.

Except as otherwise provided in these Specifications, or approved in writing by the Engineer, prime coats, undercoats, and finish coats on any one item shall be of the same manufacturer. If the incorrect prime coat is applied for any reason, it shall be sandblasted off and replaced with the specified primer.

When multiple coats of the same material are specified, the prime coat and undercoats applied shall be tinted with aluminum powder, lamp black, or other suitable pigment to distinguish it from the following coat and finish coat.

Sufficient time shall be allowed between coats to insure proper drying unless these Specifications or manufacturer's recommendations specifically state otherwise. Excessive time or exposure between coats shall not occur in cases where such excessive time or exposure will impair the bond between coats. To prevent impairment of bond between coats, space heaters shall be provided to dry the coat or keep the coating dry, if recommended by the paint manufacturer or required by the Engineer.

The number of coats specified is the minimum to be applied. Suction spots between coats shall be touched up, and additional coats shall be provided if required to produce a finished surface of solid, even color, free from defects. The total thickness of the coating shall be as specified. Additional coats of paint shall be added if necessary to bring the total thickness up to not less than that specified. No holidays shall be left. Particular care shall be used to assure that the specified coverage is secured on the edges and corners of all surfaces. Additional brush coats shall be applied if necessary to cover the edges and corners. The Contractor shall control and check the dry film thickness of all coatings. The Contractor shall control and check the dry film thickness on metal surfaces with a correctly calibrated thickness meter and shall check for holidays with a low-voltage holiday detector. The Engineer may use the Contractor's detector for additional checking. However, the Engineer will use an Elcometer to check the dry film thickness of the coatings, and his findings utilizing this meter will be final as to the dry film thickness of the applied coatings.

Damaged paint or scratched painted surfaces shall be sanded smooth before repainting. Sanding and repainting shall be done to such a degree and in such a manner that all evidence of the scratches or damages are obscured.

090110 FACTORY-PAINTED EQUIPMENT

Except as otherwise noted on the Painting Schedule or specified, the following items shall receive final finish coats at the factory and shall be protected against damage during transit, storage, and erection. Damaged areas must be refinished as the original. Factory-painted items shall be of a color specified, selected, or approved by the Engineer.

- Motors
- Instrument and control panels
- Instruments
- Transmitters
- Filters

090120 ITEMS NOT PAINTED

The following items shall not be painted, unless specifically called for:

- Aluminum grating
- Aluminum, brass, bronze, copper, plastic, rubber stainless steel, chrome, everdur, or lead
- Buried or encased piping or conduit
- Exterior concrete
- Galvanized pipe trays and cable trays (supports or hangers for these shall be painted)
- Grease fittings
- Galvanized or aluminum ducting
- Nameplates
- Serial numbers
- Steel encased in concrete or masonry
- warning or operating instruction labels

090130 PAINTING CONCRETE, MASONRY, PLASTER, AND STUCCO

Except as otherwise noted on the Painting Schedule or specified herein, exterior concrete shall not be painted. Interior floors shall be sealed and painted as noted, and other interior surfaces including ceilings, shall be painted as set forth in the Painting Schedule. Unless otherwise indicated, porous block shall be filled to provide a smooth base. Form release agents shall be removed from poured or precast surfaces by sandblasting or as recommended by the paint manufacturer. Concrete masonry, plaster, and stucco shall be coated as specified in the following. Exterior masonry panels shall be sealed and painted as indicated on the Painting Schedule. See DIVISION 4 for masonry sealer.

090140 PAINTING METAL SURFACES

Except as otherwise specified or indicated on the Painting Schedule, all metal shall be painted. Metal surfaces shall be primed and painted as specified in the following paragraphs.

Steel and miscellaneous iron items which are to be built into masonry or concrete shall, unless otherwise noted, have no field painting. Steel and miscellaneous iron items which have had a shop primer and which will be concealed above the ceilings shall be field primed. This includes but is not limited to the unexposed underside of steel roof decks and structural steel items such as beams, channels, and angles. Touching up of these items shall be done after erection but before installation of the ceiling system. No further painting of these items will be required.

090141 PRIMING OF METALS

Metals shall be primed as specified in the following.

090141.01 SHOP PRIMING OF METALS

Certain items have been listed to receive complete finish at the factory. Surfaces specified to be field sandblasted and galvanized surfaces, shall not be shop coated. All other ferrous surfaces, except stainless steel and surfaces specified or shown to receive epoxy or grease type coatings, shall receive a shop coat of

primer compatible with the finish coats specified. Primers shall be as specified for field priming. Surface preparation shall be as specified hereinbefore. Shop primer shall be compatible with field primer and finish coats. Shop primer shall be applied to a dry film thickness of not less than 2.0 mils.

090141.02 FIELD PRIMING OF METALS

All shop primed metal surfaces shall be field primed as follows before the finish coats are applied. All abraded, scratched, or otherwise damaged areas in the shop prime coat shall be sanded smooth or receive power tool cleaning SP-3 and then spot primed. The entire surface shall then be given a second prime coat compatible with the shop prime coat and the finish coats. Where the entire shop priming is failing, weathered excessively, or where recommended by the paint manufacturer's representative, the entire shop prime coat shall be removed with SP-6 commercial sandblast surface preparation before repriming.

Unless specified under the individual painting system, metal shall be field primed as specified in the following. In general the specified primers are not universal type primers and are not compatible with epoxy, chlorinated rubber, and vinyl finish coats. Primers for epoxies, chlorinated rubber, and vinyl coating primers have been specified under the individual coating system.

Paint manufacturer's representative shall recommend changes in metal primers where specified primers and finish coats are not compatible. Changes shall be submitted for approval. Where the shop primer is not compatible with field primer and/or finish coats, the shop primer shall be removed by sandblasting to not less than SP-6 commercial sandblast. All shop primer shall be removed from all metal to be installed as submerged metal by sandblasting to near white SP-10.

Primer for ferrous metal shall be a long oil alkyd primer unless a phenolic-alkyd primer is recommended by the paint manufacturer. Phenolic-alkyd primers shall be used as field primers only and shall be applied not less than one week before application of the finish coats. Phenolic-alkyd primers shall be Koppers Pug, Tnemec 77, or equal. Primers shall be Sherwin-Williams Kromik Metal Primer E41-N1, Glidden Glid-Guard Primer No. 4570, Mobil Primer 13-R-53, Tnemec 99 Red Metal Primer, or equal. Primer shall be applied to a dry film thickness of not less than 2.0 mils. Primer shall be finish coated within the time recommended in writing by the paint manufacturer. Primed surfaces exposed longer than this recommended period shall be SP-7 sandblasted and reprimed prior to finish painting.

Galvanized, sherardized, aluminum, copper, or bronze surfaces to be painted shall be solvent cleaned and receive a surface preparation as specified hereinbefore, then either wash coated and primed or primed with a special primer in accordance with the directions of the manufacturer of the finish coats. Unless specifically specified otherwise by the paint manufacturer, the primer for aluminum shall be a zinc chromate type primer, Sherwin-Williams B50-Y1, Glidden 471, or equal.

090142 PAINTING ARCHITECTURAL METAL

Doors, ventilators, louvers, grilles, exposed sheet metal, exposed flashing, and other architectural metals, structural or nonstructural, that is an integral part of the structure or building shall be painted as specified or as indicated on the Painting Schedule. All metal shall be primed as specified. The painting systems for interior and exterior architectural metals shall be as follows.

090142.02 SEMI-GLOSS FINISH

Semi-gloss finish for interior and exterior architectural metal shall consist of two or more exterior acrylic latex finish coats over one or more coats of primer to a dry film thickness of not less than 5.0 mils. Acrylic latex finish coats shall contain not less than 32 percent solids by volume and not less than 23 percent pigment by weight. Finish systems shall be the following or equal.

GLIDDEN: Finish coats shall be Glidden Spred Latex Enamel 3900 applied to a dry film thickness of not less than 3.0 mils.

MOBIL: Finish coats shall be Mobil Series 44 Water Acrylic Enamel.

SHERWIN-WILLIAMS: Finish coats shall be two or more coats of Sherwin-Williams Series B-42 Metalatex Semi-gloss Enamel to a dry film thickness of not less than 3 mils.

090142.03 GLOSS FINISH

Gloss finish for interior and exterior architectural metal shall consist of two or more coats of alkyd enamel applied over one or more coats of primer to a dry film thickness of not less than 5.0 mils. Finish coats shall be not less than 35 percent solids by volume and 29 percent pigment by weight. Coating systems shall be as follows or equal.

GLIDDEN: Finish coats shall be two or more coats of Glid-Guard Alkyd Industrial Enamel No. 14204 to a dry film thickness of not less than 3.0 mils.

MOBIL: Finish coat shall be two or more coats of Mobil Series 42 Gloss Water Acrylic Enamel.

PORTER: Finish coats shall be two or more coats of Porter I.A.-24 applied to a dry film thickness of not less than 3.0 mils.

SHERWIN-WILLIAMS: Finish coats shall be two or more coats of Ken Lustral Enamel Series F65 applied to a dry film thickness of not less than 3.0 mils.

TNEMEC: Finish coats shall be two or more coats of Tnemec-gloss Series 2 to a dry film thickness of not less than 3.0 mils.

090143.03 EPOXY COATINGS

Epoxy coatings for submerged metal shall be applied where specified or noted on the Painting Schedule. Epoxy shall be a colored polyamide cured epoxy consisting of not less than 49 percent solids by volume. Coatings and pigments used on potable water service shall have FDA approval and shall be approved for use with potable water. Painting systems shall be as follows or equal applied to dry film thickness of not less than 10 mils. The finish coat color shall be white. The system shall be a two or three coat system consisting of a prime coat and two topcoats. The paint systems shall be as indicated in this section. All surfaces receiving this paint system shall have a near white blast surface preparation of SSPC - SP10.

This product shall meet or exceed the following test requirements established:

Abrasion:	Method: ASTM D 4060, CS-17 Wheel, 1,000 grams load. Requirement: No more than 120 mg. loss after 1,000 cycles.
Adhesion:	Method: ASTM D 4541 Requirement: Not less than 950 psi pull, average of three tests. Method: ASTM D 3359 Method B, Crosshatch adhesion. Requirement: Not less than a rating of 5, (no removal), average of three tests.
Fresh Water:	Method: Coating system applied to SSPC-SP10 cleaned hot-rolled steel, cured 7 days prior to testing and immersed in aerated tap water at 77 F. Requirement: No blistering, delamination or other loss of film integrity after 4 years exposure.
Salt Spray: (FOG)	Method: ASTM B 1176 applied to SSPC-SP10 cleaned hot rolled steel. Requirement: No blistering, cracking or delamination of film. No more than 1/16 in. rust creepage at scribe, and no more than two percent rusting at edges after 1,000 hours exposure.
Dielectric Strength	Method: ANSI/ASTM D 149 (short-term test) Requirement: No less than 1,050 volts/mil, average of five tests.
TNEMEC:	Three or more coats of Series 20 - Pota-Pox to attain the required thickness.

090144 MISCELLANEOUS UNSUBMERGED METALS

Interior and exterior miscellaneous unsubmerged metals exposed to view that are not specified to be painted otherwise or left unpainted shall be painted with a long oil alkyd gloss enamel.

These items shall include but not be limited to the following:

Pipe hangers, supports, and saddles; conduits, cable tray hangers and supports.
Motors, internal combustion engines, and motor and engine accessory equipment
Drive gear, speed reducer housings; belt, chain, and coupling housings (inside and out); and gear drive miscellaneous equipment
Floor-mounted valve and gate operators and stands, and other valve operators and operator supports.
Structural steel (where not specified under architectural coatings), crane and hoist rails, and exterior of tanks and other containment vessels (not otherwise specified).
Mechanical equipment supports, drive units, and all accessories.
Exterior of conveyor and elevator housing including bucket elevators, screw conveyors, pneumatic transfer system, etc.
Sludge collector mechanisms, thickener mechanisms, and similar drive mechanisms; access bridges, support beams, and similar structures above the top of basin walls

Ladders, ladder guards, ferrous handrails, light standards, light fixtures, manhole covers, and hatchways.

Other miscellaneous metals listed or not listed on the Painting Schedule.

The system shall be as specified in 090146.

090145 UNDERGROUND METALS

All exposed underground metals shall be coated. Pipe coatings are covered under the individual pipe sections in DIVISION 15, PIPE AND PIPING SYSTEMS.

Underground valves and valve boxes shall be coated with not less than two coats of asphalt varnish in accordance with AWWA C 500.

Underground pipe flanges (excluding pipe), corrugated metal pipe couplings, flexible pipe couplings and miscellaneous underground metals not specified otherwise to receive a protective coating, shall be coated with not less than 20 mils of T.C. Mastic manufactured by the Tapecoat Company; Bitumastic No. 50 manufactured by the Koppers Company, Inc.; or equal.

090146 PIPE COATINGS

Pipe (insulated and uninsulated), miscellaneous pipe fittings, and valves shall be coated and color coded as specified in the following.

090146.01 PIPE COATING COLOR AND IDENTIFICATION

Exposed pipe shall be color coded as listed in the following table, except submerged pipe, pipe supported in cable or pipe trays (small diameter), and pipe less than 3/8-inch in diameter and where specified otherwise. Pipe nominal 3/8-inch or smaller shall be painted the same as the wall, ceiling, or piece of equipment to which it is attached.

All pipe to be color coded shall be painted the background color indicated in its entirety. When so indicated, it shall be further identified by an 8-inch wide circumferential band at its origin and termination, on each side of all walls, above and below all floors and ceilings, at points of entering or leaving pipe or cable trays, at all valves and fittings, and at no greater than 25-foot intervals between such markings.

Where two or more pipes run parallel, markings shall be applied in the same relative location on each so as to be in vertical or horizontal linearity as the case may be and present a neat appearance. Where numerous fittings occur close together as in manifolds and around equipment, the above specifications as to location of banding shall be modified as indicated by good judgment to prevent a cluttered appearance.

Loose handles, wrenches, operating keys, etc. for valves shall be painted along with the valves.

PIPE COLOR CODE CHART

<u>Pipe Contents</u>	<u>Background Color</u>	<u>Band</u>
Natural Gas	ANSII Yellow	None
Water, Potable	Blue	White
Secondary Water	Purple	None

COLOR CHART

<u>Color</u>	<u>Sherwin-Williams</u>	<u>Glidden</u>	<u>Koppers</u>
Blue	Pale Blue F65-L7	Atomic Blue	Light Blue 301
Brown	Rich Brown F65-N11	Warm Brown 4537	Dark Brown 318
Gray	Light Gray F65-A2	Neutral Gray 4572	Medium Gray 307
Light Green	Pale Green F65-G42	Metal Green	Jade Green 336
Medium Green	Medium Green F65-G40	Medium Green 4554	Oliver Green 305
Orange	Orange F65-E36	Orange 4552	Orange 393
Red	Vermillion F65-R1	Red 4556	Vermillion 314
White	Semi-Gloss White F65-W2	White 4550	White 311
Yellow	Medium Yellow F65-Y46	Medium Yellow 4560	Medium Yellow 339

ANSI colors shall be in accordance with ANSI Z 53.1 (latest edition).

090146.02 COATING METAL PIPE

Color coded metal pipe shall be coated with a high gloss alkyd system as indicated on the Paint Schedule and specified below. Colors for color coating of pipe shall be as specified above. Metal pipe shall be power tool cleaned SP-3 or commercial blast cleaned SP-6.

ALKYD SYSTEM: The alkyd system shall consist of two or more finish coats applied over a primer to a total dry film thickness of not less than 6 mils. Paint shall consist of not less than 42 percent solids by volume and 32 percent pigment by weight.

The product system shall meet or exceed the following requirement. (Published literature or test data showing conformance to these tests shall be submitted.

1. Adhesion: Not less than a rating of 4.5, average of 3 trials. (ASTM D 3359 Method B, Crosshatch Adhesion).
2. Exterior Exposure: No less than a gloss reading of 25 as measured with a 60-degree gloss meter after 12 months exposure. (Exposed at 45 degrees facing south, South Florida marine).
3. Flexibility: No less than 30 percent elongation. (Passes 1/8" mandrel) (ASTM D 522)

4. Salt Spray (Fog): No blistering, cracking or delamination of film; no more than 1/16 in. rust creepage at scribe and no more than 2 percent rusting at edges after 500 hours exposure (ASTM B 117)

Finish systems shall be the following or equal.

Tnemec: Apply one coat of Series 37 Alkyd-Phenolic rust-inhibited primer. Apply two or more top coats of Series 2H Hi-Build Alkyd Enamel.

ALUMINUM SYSTEM: The aluminum system shall consist of one coat of metal primer followed by two coats of aluminum paint. Where aluminum paint occurs over insulation, the two coats of aluminum paint shall be applied over the insulation after priming as specified. The aluminum coats shall be applied to a dry film thickness of not less than 2.5 mils.

Finish systems shall be the following or equal.

Aluminum paint shall be not less than 12 percent pigment by weight and volume solids not less than 42 percent. Paint systems shall be the following or equal system.

Glidden: Apply one coat of primer as specified for alkyd system followed by two coats of Glidden 5227 Glid-Guard Alkyd Tank and Structural Enamel.

Mobil: Apply one coat of primer as specified for alkyd system followed by two coats of Mobil 11-A-33 Ready Mix Heavy-Duty Aluminum.

Porter: One coat of Porter 297 primer to steel and black iron and Porter 296 primer to galvanized surfaces after pretreatment followed by two coats of Porter 293.

Sherwin-Williams: Apply one coat of primer as specified for alkyd system followed by two coats of Silver-Brite Heavy-Duty Aluminum Paint B59 S2.

090149 DISSIMILAR METALS

Where aluminum surfaces come in contact with dissimilar metals, except Type 304 or Type 316 stainless steel, aluminum surfaces shall be kept from direct contact with said metal by use of neoprene gaskets or washers, polyethylene self-adhesive tape (two wraps of 20-mil tape), or washers. Galvanizing or paint will not be considered as adequate protection.

Aluminum surfaces to be placed in contact with wood, concrete, or masonry construction shall be given a heavy coat of an alkali-resistant bituminous paint or two coats of a zinc chromate primer before installation. The bituminous paint shall be Koppers Bitumastic Black Solution, Porter Tarmastic No. 104, Tnemec 449 Heavy-Duty Black, or equal. The paint shall be applied as it is received from the manufacturer without the addition of any thinner, and the surface shall be cleaned according to the manufacturer's instructions. Not less than two coats shall be applied. Zinc chromate shall be allowed to air dry 24 hours before the aluminum is placed in contact with the concrete. Paint shall be Sherwin-Williams zinc chromate primer B50 Y1, Glidden No. 5533 zinc chromate primer, or equal. All exposed surfaces shall be cleaned of any coating before installation.

Coatings shall be continuous and holiday free.

All stainless steel bolt and screw surfaces in contact with aluminum shall be coated with Never-Seez by Never Seez Compound Corp., WLR No. 111 by Oil Research Inc., or equal.

090170 PAINTING FIBERGLASS AND PLASTIC

Exposed fiberglass and plastic indicated on the Painting Schedule or specified shall be coated with two coats of vinyl paint following surface preparation to a dry film thickness of not less than 4 mils. PVC and other plastics shall have the surface roughened by solvent washing with xylene or vinyl thinner approved by the paint manufacturer. Fiberglass shall be cleaned per SSPC SP-1 (solvent cleaning) and coated immediately after drying. Painting systems shall be the following or equal systems.

AMERON: Apply two coats of Amercoat No. 99.

GLIDDEN: Apply one coat of Glidden 5521 Vinyl-Cote Primer followed by one coat Glidden 5514 Double Build Vinyl.

MOBIL: Apply two coats of Mobil Series 80.

KOPPERS: Apply one coat of Rigortex 3305 Intermediate Coat followed by one coat of Rigortex 3305 Finish Coat.

TNEMEC: Apply one coat of Vinoline 53 Hi-Build Mastic followed by one coat of Vinoline 35.

090181 FLOOR AND WALKWAY COATINGS

Where indicated on the Painting Schedule or specified, floor and walk surfaces shall be painted with a two component epoxy/polyamide primer/sealer. Prior to coating, concrete floors shall be cured a minimum of 28 days and thoroughly etched with muriatic acid as recommended by the paint manufacturer. After etching, the muriatic acid shall be thoroughly removed with clean water. The concrete shall be allowed to dry not less than 48 hours following cleaning before application of the coating. The system shall be a minimum of 3 coats manufacturer's recommended thickness per coat with the final coat being a skid resistant surface. Coatings shall be the following or equal systems:

TNEMEC: Series 567 Tnemec-Tread.

FEDERAL INTERNATIONAL CHEMICALS: Series PR-14 Quick Primer/Sealer with a top coat of UR-6 aliphatic urethane.

The finish color shall be gray and the product system shall meet or exceed the following test requirements.

ABRASION: Method - ASTM D 4060, CS-17 Wheel, 1,000 grams load
Requirement: No more than 105 mg. loss after 1,000 cycles

ADHESION: Method: ASTM D 4541. Coating system applied to sandblasted concrete and cured 14 days at 77 F.

Requirement: Not less than 375 psi pull, average of three tests.

090182 NONSKID FLOOR OR WALKWAY

Where indicated on the Plans or specified, floor and walkways shall be skidproofed as follows.

An additional coat of paint shall be applied to the surface. While the surface is still wet, the area to be made nonskid shall have blow onto it clean, sharp, dry silica sand of a size all passing a 20-mesh screen, but all retained on a 40-mesh screen. The surface of the paint and sand shall be allowed to dry for at least 48 hours, after which time the excess sand shall be broomed off and the area given a final coating of the same paint applied to such thickness as to completely cover the sand grains but not to fill the valleys between. The area outside that which is to be skid-proofed shall be protected from sand by masking tape during the operations.

090184 SPECIAL COLOR AND PAINTING REQUIREMENTS

Items specified in the following shall be finish color coated as specified. ANSI colors shall conform with (OSHA) ANSI Z53.1-1971 and latest revisions.

Color coating shall be with the system specified for the equipment, concrete, etc. Where the coating system is not specified and color coating is required, the items shall be coated with a primer and two or more coats of Kem Lustral Enamel Series F65; a primer and two coats Glid-Guard Alkyd Industrial Enamel; or equal.

090184.01 RED

Items listed in ANSI Z53.1-1971, Section 2.1 shall be painted ANSI Red. In general, these items shall include fire protection equipment and apparatus; danger signs and locations; and stop bars, buttons, or switches. In addition all hose valves and riser pipes, fire protection piping and sprinkler systems, and electrical stop switches shall be painted ANSI Red.

090184.02 ORANGE

Items listed in ANSI Z53.1-1971, Section 2.2 shall be painted ANSI Orange. ANSI Orange shall be used as a basic color for designating dangerous parts of machines or energized equipment which may cut, crush, shock, or otherwise injure and to emphasize such hazards when enclosure doors are open or when gear belt or other guards around moving equipment are open or removed, exposing unguarded hazards. In addition moving machinery having a linear or peripheral speed in excess of 10 feet per minute, which is either inadequately guarded due to physical problems or may be operated with the guard removed, rims of sprockets, gears, pulleys, etc.; crossheads of large engines and compressors; and fly-wheels shall be coated ANSI Orange.

090184.03 YELLOW

Items listed in ANSI Z53.1-1971, Section 2.3 shall be painted ANSI Yellow. Yellow shall be the basic color for designating caution and for marking physical hazards such as striking against, stumbling, falling, tripping, and "caught in between." In addition an 8-inch wide strip on the top and bottom tread of stairways shall be coated.

090184.04 GREEN

Items listed in ANSI Z53.1-1971, Section 2.4 shall be painted ANSI Green. Green shall be the basic color for designating safety and the location of first-aid equipment. In general, gas masks, first-aid kits, eye wash facilities, and safety deluge showers shall be coated ANSI Green.

090184.05 PURPLE

Items listed in ANSI Z53.1-1971, Section 2.5 shall be painted ANSI Purple. In general, atomic sludge density meters shall be coated ANSI Purple.

090199 PAINTING SCHEDULE

Painting shall be as specified in this section of the Specifications and as indicated on the Plans and specified herein.

In general, all steel, iron, and wood surfaces shall be painted unless specifically indicated or specified otherwise. Concrete surfaces shall be painted only where indicated or specified. In general, exterior concrete and concrete exposed to wastewater inside basins and tanks shall not be painted and concrete and masonry inside buildings, basements, equipment rooms, etc. shall be painted. Aluminum surfaces shall not be painted unless specifically indicated or specified.

The Painting Schedule sets forth a listing of the type of items and type of paint system which they shall receive. This Schedule shall compliment the lists of items to be painted listed hereinbefore. This listing is not necessarily complete, and items of a like nature as shown on the Painting Schedule shall be painted the same as if they were included in the Painting Schedule. In case of question as to whether an item is to be painted, or as to type of paint system to use, the Engineer shall be consulted to render a judgment.

A. Schedule of metal surfaces to receive paint.

1. Acrylic latex semi-gloss (090142 and 090142.02).
 - a.. Miscellaneous architectural metals and flashing not color anodized.
 - b. All exposed structural steel.
2. Epoxy (090143.03)
 - a. Exposed steel in contact with water.
 - b. Interior of fabricated steel pipe and fittings.
 - c. Exterior of fabricated steel pipe and sleeves cast in concrete.
3. Coal tar mastic (090145).

- a. Underground flexible couplings.
- b. Buried valves and valve boxes.
- 4. Alkyd gloss enamel (090146 and 090146.2).
 - a. Piping, supports, and piping insulation (all PVC pipe exposed shall be coated as specified under 090170).
 - b. Valves, valve operators, stands, and all piping appurtenances.
 - c. Pumps and piping.
 - d. Equipment supports

C. Colors.

- 1. See 090100, 090146, 090146.01, and 090184.

D. Pipe Marking.

- 1. See 090146.01.

E. Dissimilar Metals

- 1. See 090149.

F. Safety Strips

- 1. See 100140 and 100150.

*** END OF DIVISION 9 ***