DIVISION 09

FINISHES

SECTION 09250 - GYPSUM DRYWALL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Gypsum board screw attached to steel framing and furring members.

2. Trim accessories.

3. Joint treatment materials.

4. Miscellaneous materials.

B. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to Work of this Section.

1.02 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA 505 for definitions of terms for gypsum board construction not otherwise defined in this Section or other referenced standards.

1.03 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01300, Submittals covering the items included under this Section. Shop Drawing submittals shall include:

1. Product data from manufacturers for each type of product specified.

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain gypsum board and joint treatment materials from a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum boards flat to prevent sagging.

C. Handle gypsum boards to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

1.06 PROJECT CONDITIONS

A. Environmental Conditions: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.

B. Minimum Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 degrees F (4 degrees C). For adhesive attachment and finishing of

gypsum board maintain not less than 50 degrees F (10 degrees C) for 48 hours prior to application and continuously thereafter until drying is complete.

C. Ventilate building spaces to remove water not required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:

1. Grid Suspension Systems:

   a. Chicago Metallic Corp.

   b. National Rolling Mills Co.

2. Gypsum Boards and Related Products:

   a. Centex American Gypsum Co.

   b. Domtar Gypsum Co.

   c. Georgia-Pacific Corp.

   d. Gold Bond Building Products Division, National Gypsum Co.

   e. United States Gypsum Co.

3. Type X gypsum Wallboard

   a. "Gyprock Fireguard 'C' Gypsum Board," Domtar Gypsum Co.

   b. "Fire-Shield G," Gold Bond Building Products Division, National Gypsum Co.

   c. "Sheetrock Brand Firecode 'C' Gypsum Panels," United States Gypsum Co.

4. Water, Mold, and Abuse Resistant Gypsum Board:

   a. “Fiberock Aqua-Tough Interior Panel,” United States Gypsum Co.

2.02 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

A. Provide components which comply with ASTM C 754 for materials and sizes unless otherwise indicated.

B. Concrete Inserts: Inserts designed for attachment to concrete forms and for embedment in concrete, fabricated from corrosion-resistant materials, with holes or loops for attachment of hanger wires and capability to sustain, without failure, a load equal to 3 times that imposed by ceiling construction, as determined from testing per ASTM E 488, conducted by the independent testing laboratory.

C. Wire for Hangers and Ties: ASTM A 641, Class 1, zinc coating soft temper.

D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Grid Suspension System: ASTM C 645, manufacturer's standard grid suspension system composed of main beams and cross furring members which interlock to form a modular supporting network.

2.03 GYPSUM BOARD

A. Provide gypsum board to comply with ASTM C 840 for application system and support spacing indicated in maximum lengths available to minimize end-to-end joints.

B. Gypsum Wallboard: ASTM C 36, and as follows:

1. Type:

a. Regular, unless otherwise indicated.

b. Type X for fire resistance-rated assemblies.

2. Edges: Tapered.

3. Thickness: 5/8 inch unless otherwise indicated.

C. Water, mold, and abuse resistant interior Gypsum Panel:

1. Type:

a. Fiberrock Aqua-Tough Interior Panels, AR, USG

2. Edges: Tapered; ends cut square.

3. Thickness: 5/8 inch unless otherwise indicated.

2.04 TRIM ACCESSORIES

A. Cornerbead and Edge Trim for Interior Installation: Provide corner beads, edge trim, and control joints which comply with ASTM C 1047 and requirements indicated below:

1. Material: Formed metal, plastic, or metal combined with paper, with sheet steel coated with zinc by hot-dip or electrolytic processes, or with aluminum.

2. Edge trim shapes indicated below by reference to designations of Figure 1 in ASTM C 1047:

a. LC-bead, unless otherwise indicated.

B. One-Piece Control Joints: Formed with V-shaped slot per Figure 1 in ASTM C 1047, with slot opening covered with removable strip.

2.05 GYPSUM BOARD JOINT TREATMENT MATERIALS

A. Provide materials complying with ASTM C 475, ASTM C 840, and recommendations of manufacturer of both gypsum board and joint treatment materials for application indicated.

B. Joint Tape: Paper reinforcing tape unless otherwise indicated.

C. Setting-Type Joint Compounds: Factory pre-packaged, job mixed, chemical hardening powder products formulated for uses indicated.

1. For pre-filling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.

D. Drying-Type Joint Compounds: Factory pre-packaged vinyl-based products complying with following requirements for formulation and intended use.

1. Ready-Mix Formulation: Factory pre-mixed product.

2. All-purpose compound formulated for use as both taping and topping compound.

2.06 MISCELLANEOUS MATERIALS

A. Provide auxiliary materials for gypsum drywall construction which comply with referenced standards and recommendations of manufacturer of gypsum board.

B. Spot Grout: ASTM C 475, setting-type joint compound of type recommended for spot grouting hollow metal doorframes.

C. Gypsum Board Screws: ASTM C 1002.

D. Asphalt Felt: ASTM D 226, Type I (No. 15).

E. Concealed Acoustical Sealant: Nondrying, nonhardening, nonskinning, nonstaining, nonbleeding, gunnable sealant complying with requirement specified in Section 07900.

PART 3 - EXECUTION

3.01 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure that inserts and other structural anchorage provisions have been installed to receive ceiling anchors in a manner that will develop their full strength and at spacing required to support ceiling.

1. Provide concrete inserts and other devices indicated, to other trades for installation well in advance of time needed for coordination with other construction.

3.02 INSTALLATION OF STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. Screw furring members to wood framing.

B. Secure hangers to structural support by connecting directly to structure where possible; otherwise, connect to cast-in concrete inserts or other anchorage devices or fasteners.

1. Do not attach hangers to metal deck tabs.

2. Do not attach hangers to metal roof deck.

C. Install suspended steel framing components in sizes and at spacings indicated but not less than that required by referenced steel framing installation standard.

1. Wire Hangers: 0.1620-inch diameter (8-gauge), 4 feet on center.

2. Carrying Channels (Main Runners): 1-1/2 inches, 4 feet on center.

3. Rigid Furring Channels (Furring Members): 16 inches on center.

D. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring members or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.

E. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

3.03 APPLICATION AND FINISHING OF GYPSUM BOARD

A. Gypsum Board Application and Finishing Standard: Install and finish gypsum board to comply with ASTM C 840.

B. Install sound attenuation blankets where indicated, prior to gypsum board unless readily installed after board has been installed.

C. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 24 inches in alternate courses of board.

D. Install ceiling boards across framing in a manner which minimizes the number of end-butt joints, and which avoids end joints in central area of each ceiling. Stagger end joints at least 24 inches.

E. Install wall/partition boards by parallel application method (long edges parallel to framing). At stairwells and similar high walls, install board horizontally with end joints staggered over studs and back-block edge joints for continuous support.

F. Install exposed gypsum board with face side out. Do not install imperfect, damaged, or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16-inch open space between boards. Do not force into place.

G. Located either edge or end joints over supports, except in horizontal applications or where intermediate supports or gypsum board back-blocking is provided behind end or edge joints. Position boards so that like edges abut, tapered edges against tapered edges and mill-cut or field-cut ends against mill-cut or field-cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

H. Attach gypsum board to steel studs so that leading edge or end of each board is attached to open (unsupported) edge of stud flange first.

I. Spot grout hollow metal doorframes for solid core wood doors and hollow metal doors. Apply spot grout at each jamb anchor clip just before inserting board into frame.

J. Form control joints and expansion joints at locations indicated, with space between edges of boards, prepared to receive trim accessories.

K. Cover both faces of steel stud partition framing with gypsum board in concealed spaces (above ceilings, etc.), except in chase walls which are properly braced internally.

1. Except where concealed application is required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 square feet area, and may be limited to not less than 75 percent of full coverage.

2. Fit gypsum board around ducts, pipes, and conduits.

3. Where partitions intersect open concrete coffers, cut gypsum board to fit profile of coffers and allow 1/4- to 1/2-inch-wide joint for sealant.

L. Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4- to 1/2-inch space and trim edge with U-bead edge trim. Seal joints with acoustical sealant.

M. Floating Construction: Where feasible or where recommended by manufacturer, install gypsum board over wood framing with floating internal corner construction.

N. Space fasteners in gypsum boards in accordance with referenced gypsum board application and finishing standard and manufacturer's recommendations.

3.04 METHODS OF GYPSUM BOARD APPLICATION

A. Single Layer Application: Install gypsum wallboard as follows:

1. On ceilings, apply gypsum board prior to wall/partition board application to the greatest extent possible.

2. On partitions/walls, apply gypsum board vertically (parallel to framing) unless otherwise indicated, and provide sheet lengths which will minimize end joints.

3. On ceilings, apply base layer prior to application of base layer on walls/partitions; apply face layers in same sequence. Offset joints between layers at least 10 inches. Apply base layers at right angles to supports unless otherwise indicated.

4. On partitions/walls, apply base layer and face layers vertically (parallel to framing) with joints of base layer over supports and face layer joints offset at least 10 inches with base layer joints.

B. Single Layer Fastening Method: Fasten gypsum boards to supports with screws:

3.05 INSTALLATION OF DRYWALL TRIM ACCESSORIES

A. Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges to comply with manufacturer's recommendations.

B. Install corner beads at external corners.

C. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed, and except where plastic trim is indicated. Provide type with face flange to receive joint compound except where U-bead (semi-finishing type) is indicated.

1. Install LC-bead where drywall construction is tightly abutted to other construction and back flange can be attached to framing or supporting substrate.

D. Install control joints at locations indicated or, if not indicated, at spacings and locations required by referenced gypsum board application and finish standard, and approved by Engineer for visual effect.

3.06 FINISHING OF DRYWALL

A. Apply joint treatment at gypsum board joints (both directions), flanges of corner bead, edge trim, and control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare Work for decoration.

B. Pre-fill open joints and rounded or beveled edges, if any, using setting-type joint compound.

C. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.

D. Finish interior gypsum wallboard by applying following joint compounds in 3 coats (not including pre-fill of openings in base), and sand between coats and after last coat:

1. Embedding and First Coat: Setting type joint compound.

2. Fill (Second) Coat: Setting type joint compound.

3. Finish (Third) Coat: Ready-mix drying type, all-purpose or topping compound.

E. Water-Resistant Gypsum Backing Board Base for Ceramic Tile: Comply with ASTM C 840 and manufacturer's recommendations for treatment of joints behind tile.

F. Partial Finishing: Omit third coat and sanding on concealed drywall Work which is indicated for drywall finishing or which requires finishing to achieve fire-resistance rating, sound rating, or to act as air or smoke barrier.

END OF SECTION

SECTION 09510 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Extent of each type of acoustical ceiling as shown on Drawings and Scheduled.

B. Types of acoustical ceilings specified in this Section include the following:

1. Acoustical panel ceilings, exposed suspension.

C. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to Work of this Section.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01300, Submittals covering the items included under this Section. Shop Drawing submittals shall include:

1. Product Data: Manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

2. Samples for Initial Selection Purposes: Manufacturers' standard size samples of acoustical units, but not less than 6 inches square, and of exposed ceiling suspension members including wall and special moldings. Provide samples showing full range of colors, textures, and patterns available for each type of component required.

3. Samples for Verification Purposes: Submit the following:

a. 6-inch-square samples of each acoustical panel type, pattern, and color.

b. Set of 12-inch-long samples of exposed runners and moldings for each color and system type required.

4. Certificates from manufacturers of acoustical ceiling units and suspension systems attesting that their products comply with specification requirements.

1.03 QUALITY ASSURANCE

A. Fire Performance Characteristics: Provide acoustical ceiling components that are identical to those tested for the following fire performance characteristics, according to ASTM test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical ceiling components with appropriate marking of applicable testing and inspecting agency.

1. Surface Burning Characteristic tested per ASTM E 84, as follows:

a. Flame Spread: 25 or less.

b. Smoke Developed: 50 or less.

B. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other Work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition system (if any).

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to Site in original, unopened packages, and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, or other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.05 PROJECT CONDITIONS

A. Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:

1. Acoustical Panels:

a. Mineral Composition - Nodulated, Cast or Molded with Standard Washable Painted Finish, Fissured Pattern, Non-Fire Resistance Rated:

1) "Fine Fissured," Armstrong World Industries, Inc.

2) "Fine Fissured High NRC," Certainteed.

3) "'F' Fissured," USG Acoustical Products Co.

2.02 ACOUSTICAL CEILING UNITS

A. Standard for Acoustical Ceiling Units: Provide manufacturer's standard units of configuration indicated which are prepared for mounting method designated and which comply with FS SS-S-118 requirements, including those indicated by reference to type, form, pattern, grade (NRC or NIC' as applicable), light reflectance coefficient (LR), edge detail, and joint detail (if any).

1. Mounting Method for Measuring NRC: No. 7 (mechanically mounted on special metal support), FS SS-S-118; or Type E-400 mounting as per ASTM E 795.

B. Colors, Textures, and Patterns: Provide products to match appearance characteristics indicated, or if not otherwise indicated, as selected by Engineer from manufacturer's standard colors, surface textures, and patterns available for acoustical ceiling units and exposed metal suspension system members of quality designated.

2.03 METAL SUSPENSION SYSTEMS

A. Standard for Metal Suspension Systems: Provide metal suspension systems of type, structural classification, and finish indicated which comply with applicable ASTM C 635 requirements.

B. Finishes and Colors: Provide manufacturer's standard factory-applied finish for type of system indicated on Drawings, or comparable product by one of the following:

1. Armstrong World Industries, Inc.

2. CertainTeed Corp.

4. USG Interiors, Inc.; Subsidiary of USG Corporation.

C. For exposed suspension members and accessories with painted finish, provide color indicated, or if not otherwise indicated, as selected by Engineer from manufacturer's full range of standard colors.

D. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung.

1. Concrete Inserts: Inserts formed from hot-dipped galvanized sheet steel and designed for attachment to concrete forms and for embodiment in concrete with holes or loops for attachment at hanger wires.

E. Hanger Wire: Galvanized carbon steel wire, ASTM A 641, soft temper, pre-stretched, Class 1 coating, sized so that stress at 3 times hanger design loan (ASTM C 635, Table 1, Direct Hung), will be less than yield stress of wire, but provide not less than 12 gauge.

F. Edge Moldings and Trim: Metal or extruded plastic of types and profiles indicated, or if not indicated, provide manufacturer's standard molding for edges and penetrations of ceiling which fits with type of edge detail and suspension system indicated.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.

1. Provide concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other Work.

B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

3.02 INSTALLATION

A. Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and CISCA standards applicable to Work.

B. Arrange acoustical units and orient directionally patterned units (if any) in manner shown by reflected ceiling plans.

1. Install tile with pattern running in one direction.

C. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members. Locate hangers not less than 6 inches from each end and spaced 4'-0" along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8-inch in 12'-0".

1. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which shall not deteriorate or fail with age or elevated temperatures.

2. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum which are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal force by bracing, countersplaying or other equally effective means.

D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.

E. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

1. Install hold-down clips in areas indicated, and in areas where required by governing regulations or for fire-resistance ratings; space as recommended by panel manufacturer unless otherwise indicated or required.

3.03 CLEANING

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace Work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09651 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Extent of resilient tile flooring, including locations and details, is indicated on Drawings and Schedules.

B. Related Sections: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to Work of this Section.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:

1. Submit Shop Drawings showing location and extent of resilient tile, clearly indicating directions, locations, and types of edge strips. Indicate columns, doorways, enclosing partitions, built-in cabinets, and locations where cut-outs are required in resilient tile. Show installation details at special conditions.

2. Product Data: Submit manufacturer's product literature and installation instructions for each type of resilient tile product and installation accessory required. Include methods of installation for each type of substrate.

    a. Submit written data on physical characteristics, durability, resistance to fading, and flame resistance characteristics.

3. Samples for Verification Purposes: Submit the following:

    a. Full size tiles of each type of resilient tile required.

    b. Prepare samples from the same material to be used for the Work.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm (material producer) with not less than 3 years of production experience whose published literature clearly indicates general compliance of products with requirements of this Section.

B. Installer Qualifications: Firm specializing in resilient tile installation with not less than 2 years of experience in installation of resilient tile similar to that required for this Project.

C. Single Source Responsibility: Provide resilient tile produced by a single manufacturer for each type required, including adhesives.

1.04 TESTING

A. Test Reports: Submit certified test reports evidencing compliance with requirements for the following:

1. Fire performance characteristics.

B. Fire Performance Characteristics: Provide resilient tile that is identical to that tested for the following fire performance requirements, according to test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface Burning Characteristics: As follows:

a. Flame Spread: Not more than 25.

b. Smoke Developed: Not more than 50.

c. Flame Spread: Not more than 75.

d. Smoke Developed: Not more than 100.

e. Test Method: ASTM E 84.

f. Test Method: NFPA 255.

g. Test Method: UL 723.

2. Critical Radiant Flux: As follows:

a. Rating: Not less than 0.45 watts per square centimeter.

b. Test Method: ASTM E 648.

c. Test Method: NFPA 253.

3. Smoke Density from Burning or Decomposition of Plastic, as follows:

a. Rating: Not more than 62.5 percent.

b. Test Method: ASTM D 2843.

4. Optical Smoke Density: As follows:

a. Rating: Not more than 450.

b. Test Method: ASTM E 662.

C. Physical Properties: Provide resilient tiles that are identical to those tested for the following physical properties according to the test method indicated.

D. Certification: Submit manufacturer's certificate stating that materials furnished comply with specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project Site in original factory wrappings and containers, clearly labeled with identification of manufacturer, brand name, pattern name, quality or grade, fire hazard classification, and lot number. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling; laid flat, blocked off ground to prevent sagging and warping.

B. Comply with instructions and recommendations of manufacturer for special delivery, storage, and handling requirements.

1. Maintain storage area at 55 degrees F (13 degrees C) and under 50 percent relative humidity.

1.06 PROJECT CONDITIONS

A. Maintain minimum temperature of 55 degrees F (13 degrees C) and maximum 85 degrees F (30 degrees C) in spaces to receive resilient tile for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Maintain minimum temperature of 55 degrees F (13 degrees C) where Work is complete.

1.07 SEQUENCING AND SCHEDULING

A. Sequence resilient tile installation with other work to minimize possibility of damage and soiling during remainder of construction period.

1.08 MAINTENANCE

A. Maintenance Instructions: Submit manufacturer's printed instructions for maintenance of installed Work, including methods and frequency recommended for maintaining optimum condition under anticipated traffic and use conditions. Include precautions against materials and methods which may be detrimental to finishes and performance.

B. Replacement Materials: After completion of Work, deliver not less than 2 percent of each type, color, and pattern of resilient tile, exclusive of material required to properly complete installation. Furnish accessory components as required. Furnish replacement materials from same production run as materials installed. Package replacement materials with protective covering identified with appropriate labels.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:

1. Manufacturers of Vinyl Composition Tile:

a. Amtico Flooring, Div. of American Biltrite, Inc.

b. Armstrong World Industries, Inc.

c. Azrock Floor Products Division, Azrock Industries, Inc.

d. Kentile Floors, Inc.

e. Tarkett, Inc.

2.02 MATERIALS

A. Provide tile with all vertical edges cut perpendicular to tile surface, plus or minus 0.002 inch manufacturing tolerances.

B. Material Composition:

1. Vinyl Composition Tile: Combination of vinyl, resins, plasticizers, stabilizers, fillers, and pigments, through-grained, resistant to alkali, grease, and oils, uniform disbursement of color and texture throughout thickness of tile; asbestos free.

2.03 FINISHES

A. Color and Pattern:
   1. Provide color and pattern selected by Architect from manufacturer's full range.

   2. Size: 12 inches by 12 inches.

   3. Gauge: 1/8 inch.

2.04 ACCESSORIES

A. Adhesives (Cements): Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.

B. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

C. Leveling and Patching Compounds: Latex types as recommended by flooring manufacturer.

D. Metal Edge Strips: Of width shown and of required thickness to protect exposed edge of resilient flooring. Provide units of maximum available length, to minimize number of joints.

   1. Material: Extruded aluminum with mill finish, unless otherwise shown.

   2. Type: Butt type metal edge strips for concealed anchorage.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Inspect subfloor surfaces to determine satisfactory condition; free from cracks, holes, ridges, coatings preventing adhesive bond, and other defects impairing performance or appearance.

B. Perform bond and moisture tests on concrete subfloors to determine sufficient curing and drying, and to ascertain presence of curing compounds.

   1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install resilient floor tile and accessories after other finishing operations, including painting, have been completed.

B. Maintain minimum temperature of 65 degrees F (18 degrees C) in spaces to receive resilient tile flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Maintain minimum temperature of 55 degrees F (13 degrees C) where work is complete.

C. Install resilient tile using method indicated in strict compliance with manufacturer's printed instructions. Extend resilient tile into toe spaces, door reveals, and into closets and similar openings.

D. Scribe, cut, and fit resilient tile to permanent fixtures, built-in furniture and cabinets, pipes, outlets, and permanent columns, walls, and partitions.

E. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating markings on finish flooring as marked on subfloor. Use chalk or other nonpermanent marking device.

F. Lay tile from center marks established with principal walls, discounting minor offsets, so that tiles at opposite edges of room area are of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis unless otherwise shown.

G. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable.

1. Lay tile with grain running in one direction.

H. Adhere tile flooring to substrates using full spread of adhesive applied in compliance with flooring manufacturer's directions.

1. Apply butt type metal edge strips where shown on Drawings before installation of tile flooring. Secure units to substrate with countersunk stainless steel anchors complying with manufacturer's recommendations.
2. Apply other resilient accessories as specified in Section 09658 and as shown on Drawings.

3.03 CLEANING

A. Immediately upon completion of resilient tile installation, sweep or vacuum floor thoroughly; remove any excess adhesive or other blemishes using cleaner recommended by tile manufacturer.

1. Damp-mop floor being careful to remove black marks and excessive soil.

2. Do not wash floor until time period recommended by tile manufacturer has elapsed to allow tile to become well sealed in adhesive.

3. Clean tile flooring not more than 4 days prior to date scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean flooring by method recommended by manufacturer.

3.04 PROTECTION

A. Protect flooring against damage during construction period to comply with tile manufacturer's directions.

1. Protect tile flooring against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishings across floors.
2. Cover tile flooring with undyed, untreated building paper until inspection for Substantial Completion.

3.05 FINAL CLEANING

A. Clean resilient flooring not more than 4 days prior to date scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean resilient flooring by method recommended by resilient flooring manufacturer.

B. Advise Contractor of protection methods and materials needed to ensure that resilient floor tile will be without deterioration or damage at time of Substantial Completion.

END OF SECTION

SECTION 09653 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Extent of resilient tile base and accessories, including locations and details, as indicated on Drawings and Schedules.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:

1. Shop Drawings showing location and extent of resilient base. Indicate columns, doorways, partitions, built-in cabinets, and stairs. Show installation details at special conditions.

2. Product Data: Submit manufacturer's product literature and installation instructions for each type of resilient base and installation accessory required. Include methods of installation for each type of substrate.

    a. Submit written data on physical characteristics, durability, and resistance to fading and flame resistance characteristics.

3. Samples for Verification Purposes: Submit the following:

    a. 12-inch samples of each type of resilient base specified.

    b. Prepare samples from the same material to be used for the Work.

B. Maintenance Data: Submit in accordance with requirements of Section 01600, data for items included under this Section.

C. Maintenance Instructions: Submit manufacturer's printed instructions for maintenance of installed Work, including methods and frequency recommended for maintaining optimum condition under anticipated traffic and use conditions. Include precautions against materials and methods which may be detrimental to finishes and performance.

1.03 QUALITY ASSURANCE

A. Single Source Responsibility: Provide resilient base produced by a single manufacturer for each type required, including adhesives.

1.04 TESTING

A. Test Reports: Submit certified test reports evidencing compliance with requirements for the following:

1. Fire performance characteristics.

B. Fire Performance Characteristics: Provide resilient base that is identical to that tested for the following fire performance requirements, according to test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface Burning Characteristics: As follows:
    a. Flame Spread: Not more than 25.

    b. Smoke Developed: Not more than 50.

c. Test Method: ASTM E 84.

d. Test Method: NFPA 255.

e. Test Method: UL 723.

C. Physical Properties: Provide resilient base that is identical to that tested for the following physical properties according to the test method indicated.

D. Certification: Submit manufacturer's certificate stating that materials furnished comply with specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project Site in original factory wrappings and containers, clearly labeled with identification of manufacturer, brand name, pattern name, quality or grade, fire hazard classification, and lot number. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, and soiling.

B. Comply with instructions and recommendations of manufacturer for special delivery, storage, and handling requirements.

1. Maintain storage area at 55 degrees F (13 degrees C) and below 50 percent relative humidity.

1.06 PROJECT CONDITIONS

A. Maintain minimum temperature of 65 degrees F (18 degrees C) and maximum 85 degrees F (30 degrees C) in spaces to receive resilient base for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Maintain minimum temperature of 55 degrees F (13 degrees C) where Work is complete.

1.07 SEQUENCING AND SCHEDULING

A. Sequence resilient base installation with other work to minimize possibility of damage and soiling during remainder of construction period.

1.08 MAINTENANCE

A. Replacement Materials: After completion of Work, deliver not less than 2 percent of each type, color, and pattern of resilient base exclusive of material required to properly complete installation. Furnish accessory components as required. Furnish replacement materials from same production run as materials installed. Package replacement materials with protective covering, identified with appropriate labels.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:

1. Vinyl Wall Base:

a. Johnsonite, A Tarkett Company

b. Armstrong World Industries, Inc.

c. Flexco Company.

2. Carpet and Resilient Floor Accessories:

a. Flexco Company.

b. Johnson Rubber Company.

c. Mercer Plastics Co.

d. R.C. Musson Rubber Co., Inc.

e. Roppe Rubber Corp.

2.02 WALL BASE

A. Flexible ribbed-back straight and preformed or molded corner units with factory-cut ends.

1. Height: 4 inches.

2. Style: Cove (standard 5/8-inch toe).

3. Thickness: 1/8 inch.

4. Finish: Standard.

2.03 FINISHES

A. Provide materials in colors and patterns (if applicable) as selected by Engineer from manufacturer's standard colors and patterns.

B. Installation Accessories:

1. Wall Base Adhesive: Waterproof bonding, quick setting to permit positioning before full bond, to suit material and substrate conditions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates for resilient base and accessories to determine if they are free from cracks, holes, ridges, coatings preventing adhesive bond, and other defects impairing performance or appearance.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

C. Notify Engineer/Designer in writing of all conditions detrimental to proper completion of the Work. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install resilient accessories after other finishing operations, including painting and installation of flooring materials, have been completed.

B. Install resilient accessories using methods indicated in strict compliance with manufacturer's printed instructions. Do not place seam joints in traffic areas.

C. Tightly cement resilient accessories to subbase without open cracks, voids, raising, or puckering at joints, telegraphing of adhesive, or other surface imperfections.

D. Apply wall base to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practical, with preformed corner units or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece with continuous contact at horizontal and vertical surfaces.

   1. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

E. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.

3.03 CLEANING

A. Remove any excess adhesive or other blemishes using cleaner recommended by resilient accessory manufacturer.

B. Remove surplus materials, rubbish, and debris resulting from resilient accessory installation upon completion of the work; leave areas of installation in neat, clean condition.

3.04 PROTECTION

A. Advise Contractor of protection needed to ensure that resilient accessories will be without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 09961 - HIGH PERFORMACE PAINTS AND COATINGS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Water Works Association (AWWA):
   a. C203, Coal-Tar Protective Coatings and Linings for Steel Water Pipelines-Enamel and Tape-Hot-Applied.
   b. C209, Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
   c. C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
   d. C214, Tape Coating Systems for the Exterior of Steel Water Pipelines.

2. Environmental Protection Agency (EPA).

3. International Concrete Repair Institute (ICRI) Guideline No. 310.2 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

4. NACE International (NACE): SP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.

5. ANSI / NSF International (NSF): 61, Drinking Water System Components- Health Effects.

6. National Association of Pipe Fabricators (NAPF
   a. 500-03-04, Abrasive Blast Cleaning for Ductile Iron Pipe.

7. Occupational Safety and Health Act (OSHA).

8. The Society for Protective Coatings (SSPC):
   a. PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
   b. PA 3, Guide to Safety in Paint Applications.
   c. SP 1, Solvent Cleaning.
   d. SP 2, Hand Tool Cleaning.
   e. SP 3, Power Tool Cleaning.
   f. SP 5, White Metal Blast Cleaning.
   g. SP 6, Commercial Blast Cleaning.
   h. SP 7, Joint Surface Preparation Standard Brush-Off Blast Cleaning.
   i. SP 10, Near-White Blast Cleaning.
   j. SP 11, Power Tool Cleaning to Bare Metal.
   k. SP 12, Surface Preparation and Cleaning of Metals Waterjetting Prior to Recoating.
   1. SP 13, Surface Preparation of Concrete.
   m. SP 16, Brush-off Blast cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
   n. Guide 15, Field Methods for Retrieval and Analysis of Soluble Sa1ts on Steel and Other Nonporous Substrates.
   o. TU 11, Inspection of Fluorescent Coating Systems.

1.02 SUMMARY

A. Section Includes: Field painting as shown and/or herein required. See specific items not requiring field painting under Work Not Included.

B. Provide all labor, materials, equipment and services for furnishing and installing the finishes as indicated on drawings and schedules, and as herein specified.

C. In general, exposed surfaces of factory and/or shop-primed work that are delivered to Site without a final finish shall be painted. The shop priming and intermediate shop coatings shall not be considered as included in the number of field coats specified under Part 2, Field Painting Systems Article, Finish Paints paragraph in this Section.

D. Ferrous metal surfaces, excluding stainless steel surfaces that will be exposed in the completed Work, shall be sandblasted either at the point of fabrication or under this Section prior to placement of primers. Field fabrication, including welds and cuts, shall be sandblasted, primed, and painted as herein specified.

E. Ferrous metal items that will be in contact with precast concrete slabs, masonry, etc., shall be finish painted.

F. Galvanized steel items that are not included under "Work Not Included," shall be prepared, primed, and finish painted as herein specified.

G. Bruises, mars, and/or scratches in the shop painting due to handling, shall be immediately touched up in the field by Contractor prior to any storage or installation.

H. Work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated.

I. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

J. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect-Engineer will select these from standard colors or finishes available.

K. Painting of piping includes pipe hangers, valves, and piping accessories, and also includes surfaces that will be in contact with piping supports. ALL PIPING SHALL BE COMPLETELY PAINTED.

L. Existing surfaces shall be painted where shown and/or called for. Preparation for repainting and priming shall be as herein specified.

M. Altered existing Work or damaged surfaces that are a result of the revisions shall be painted under this item of Work. The finishes shall match the existing adjacent coatings.

N. Miscellaneous equipment shipped to Site with factory-applied coatings as follows, shall be painted under this Work as specified:

1. No Factory Finish: Surface preparation, priming, and finish painting.

2. Prime Coat: Surface preparation, touch-up, and finish painting.

3. Intermediate Coat: Surface preparation, touch-up, and finish painting.

4. Pre-finished Equipment: Touch-up as required. Equipment manufacturer shall furnish necessary touch-up paint.

5. Factory finish coats, not matching the approved finish colors, that are provided in lieu of the shop prime specified shall be properly prepared and receive a final field coat to match the adjacent related Work.

O. Painting as called for on Drawings is for guidance only and does not limit the requirements for painting.

P. Work Not Included: Unless specifically called for on Drawings or specified in this Section, the following are not included:

1. Exterior exposed concrete surfaces and exposed concrete surfaces below the ground floor plan.

2. Nonferrous metals and stainless steel, except copper and brass.

3. Exterior aluminum siding.

4. Nonexposed surfaces of treated lumber.

5. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, furred areas, pipe spaces, and duct shafts.

6. Conduits below the main floor, except in rooms that are painted.

7. Exterior gratings with a hot-dipped galvanized finish.

8. Manufacturer's name and identification plates, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.

9. Overhead sectional doors - shall have a factory finish on both interior and exterior exposed surfaces.

10. PVC plastic process piping shall not be painted, but shall be stenciled and labeled or tagged for identification surfaces. Each type of process piping using PVC pipe shall be installed using the same color pipe.

11. All interior and exterior sealant and caulking unless adjacent to latex-coated surfaces and approved by Engineer.

12. Interior concrete surfaces of tanks and basins, immersed and exposed not to be painted.

13. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motors, and fan shafts will not require finish painting.

1.03 DEFINITIONS

A. Terms used in this section:

1. ASTM D 16, unless otherwise specified.

2. Coverage: total-minimum dry film thickness in mils or square feet per gallon.

3. FRP: Fiberglass Reinforced Plastic.

4. HCl: Hydrochloric Acid.

5. MDFT: Minimum Dry Film Thickness, mils.

6. MDFTPC: Minimum Dry Film Thickness per Coat, mils.

7. Mil: Thousandth of an inch.

8. PDS: Product Data Sheet.

9. PSDS: Paint System Data Sheet.

10. PVC: Polyvinyl Chloride.

11. SFPG: Square Feet per Gallon.

12. SFPGPC: Square Feet per Gallon per Coat.

13. SP: Surface Preparation.

1.04 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Submit in accordance with Division 1 Submittal Procedures.

   a. Data Sheets:
      1) For each product, furnish a Product Data Sheet (PDS), the manufacturer's technical data sheets, and paint colors available (where applicable). The PDS form is appended to the end of this section.
      2) For each paint system, furnish a Paint System Data Sheet (PSDS). The PSDS form is appended to the end of this section.
      3) Technical and performance information that demonstrates compliance with Specification.
      4) Furnish copies of paint system submittals to the coating applicator.
      5) Indiscriminate submittal of only manufacturer's literature is not acceptable.

   b. Detailed chemical and gradation analysis for each proposed abrasive material.

2. Samples:

   a. Proposed Abrasive Materials: Minimum 5-pound sample for each type.

   b. Reference Panel:

      1) Surface Preparation:
         a) Prior to start of surface preparation, furnish a 4-inch by 4-inch steel panel for each grade of sandblast specified herein, prepared to specified requirements.
         b) Provide panel representative of the steel used; prevent deterioration of surface quality.
         c) Panel to be reference source for inspection upon approval by Engineer.

2) Paint:

a) Unless otherwise specified, before painting work is started, prepare minimum 8-inch by 10-inch sample with type of paint and application specified on similar substrate to which paint is to be applied.
b) Furnish additional samples as required until colors, finishes, and textures are approved.
c) Approved samples to be the quality standard for final finishes.

B. Informational Submittals:

1. Coating manufacturer's Certificate of Compliance, in accordance with Division 1, Manufacturers' Field Services.

2. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.

3. Manufacturer's written verification that submitted material is suitable for the intended use.

4. If the manufacturer of finish coating differs from that of shop primer, provide finish coating manufacturer's written confirmation that materials are compatible.

5. Manufacturer's written instructions and special details for applying each type of paint.

C. Warranty:

1. Submit manufacturer’s standard warranty in accordance with requirements of Division 1, warranties covering the items included under this Section.

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: Minimum 5 years' experience in application of specified products.

B. Regulatory Requirements:

1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.

2. Perform surface preparation and painting in accordance with recommendations of the following:
   a. Paint manufacturer's instructions.
   b. SSPC PA 3, Guide to Safety in Paint Applications.
   c. Federal, state, and local agencies having jurisdiction.

C. Mockup:
1. Before proceeding with Work under this section, finish one complete space or item of each color scheme required showing selected colors, finish texture, materials, quality of work, and special details.
2. After Engineer approval, sample spaces or items shall serve as a standard for similar work throughout the Project.

D. Pre-application Meeting:

1. Convene a pre-application meeting two [2] weeks before start of application of coating systems. Require attendance of parties directly affecting work of this section, including Contractor, Engineer, applicator, and manufacturer's representative. Review the following:
   a. Environmental requirements.
   b. Protection of surfaces not scheduled to be coated.
   c. Surface preparation.
   d. Application.
   e. Repair.
   f. Field quality control.
   g. Cleaning.
   h. Protection of coating systems.
   i. One-year inspection.
   j. Coordination with other work.

E. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

F. Coordination of Work: Review other sections of these Specifications in which prime paints are to be provided to ensure compatibility of total coatings systems for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Shipping:

1. Where precoated items are to be shipped to the Site, protect coating from damage. Batten coated items to prevent abrasion.

2. Protect shop painted surfaces during shipment and handling by suitable provisions including padding, blocking, and use of canvas or nylon slings.

B. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

1. Name or title of material.

2. Fed. Spec. number, if applicable.

3. Manufacturer's stock number, batch number, and date of manufacturer.

4. Manufacturer's name.

5. Contents by volume, for major pigment and vehicle constituents.

6. Thinning instructions.

7. Application instructions.

8. Color name and number.

C. Storage:

1. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.

2. Primed surfaces shall not be exposed to weather for more than 2 months before being topcoated, or less time if recommended by coating manufacturer.

3. Handling: Protect materials during handling and application to prevent damage or contamination.

4. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.07 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not apply paint in temperatures or moisture conditions outside of manufacturer's recommended maximum or minimum allowable.

2. Do not perform final abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.

3. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C), unless otherwise permitted or restricted by paint manufacturer's printed instructions.

4. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F (7 degrees C) and 95 degrees F (35 degrees C), unless otherwise permitted or restricted by paint manufacturer's printed instructions.

5. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted or restricted by paint manufacturer's printed instructions. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

6. Paint only when the surface temperature is at least 5 degrees F above the dew point, unless otherwise permitted by paint manufacturer’s printed instructions.

B. Status of Existing Coatings:

1. Perform tests as required to verify condition of existing coatings and substrate conditions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Nationally recognized manufacturers of paints and protective coatings who are regularly engaged in the production of such materials for essentially identical service conditions.

B. Minimum of 5 years' verifiable experience in manufacture of specified product.

C. Each of the following manufacturers is capable of supplying most of the products specified herein:

1. TNEMEC Company, Inc.

2. The Sherwin-Williams Company.

3. PPG Industries.

4. Carboline.

2.02 ABRASIVE MATERIALS

A. Abrasives for blasting shall be sharp, washed, salt free, angular, and free from feldspar or other constituents that tend to breakdown and remain on the surface.

B. Select abrasive type and size to produce surface profile that meets coating manufacturer's recommendations for specific primer and coating system to be applied.

2.03 PAINT MATERIALS

A. General:

1. Manufacturer's highest quality products suitable for intended service. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

2. Compatibility: Only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats.

3. Thinners, Cleaners, Driers, and Other Additives: As recommended by coating manufacturer.

4. Color Pigments: Pure, non fading, applicable types to suit substrates and service indicated.

   a. Lead content in pigment, if any, is limited to contain not more than 0.06% lead, as lead metal based on the total non volatile (dry film) of paint by weight.

B. Products:

Product	Definition
Acrylic Latex	Single-component, 100% acrylic finish as required
Block Filler	Primer-sealer designed for rough masonry surfaces, acrylic emulsion, cementitious acrylic, or epoxy
Coal-Tar Epoxy	Amine, polyamide, or phenolic epoxy type, suitable for immersion service
Epoxy Filler/Surfacer	100% solids epoxy trowel grade filler and surface, nonshrinking, suitable for application to concrete and masonry
Epoxy Nonskid (Aggregated)	100% solids two-component catalyzed epoxy aggregated; aggregate may be packaged separately
Epoxy Primer- Ferrous Metal	High-build, two component catalyzed epoxy primer.
Epoxy Primer- Other	Epoxy primer, high-build, as recommended by coating manufacturer for specific galvanized metal, copper, or nonferrous metal alloy to be coated
Fusion Bonded Coating	100% solids, thermosetting, fusion bonded, dry powder epoxy, suitable for the intended service
Fusion Bonded, TFE Lube or Grease Lube	Tetrafluoroethylene, liquid coating, or open gear grease as supplied by McMaster-Carr Supply Corporation, Elmhurst, IL; RL 736 manufactured by Amrep, Inc., Marietta, GA
High Build Epoxy	High-build, two component catalyzed epoxy, capability of 3 to 5 MDFT per coat
Latex Primer Sealer	Waterborne vinyl acrylic primer/sealer for interior gypsum board and plaster. Capable of providing uniform seal and suitable for use with specified finish coats.
Gloss Polyurethane -	Two-component, aliphatic acrylic based polyurethane; high gloss finish
Multipolymeric Matrix Coating	Heat resistant single component inert multipolymeric matrix coating for high heat applications under insulation.
Water Base Epoxy	Two-component, polyamide epoxy emulsion, finish as required.

2.04 MIXING

A. Multiple-Component Coatings:

1. Prepare using each component as packaged by paint manufacturer.
2. No partial batches will be permitted.
3. Do not use multiple-component coatings that have been mixed beyond their pot life.
4. Furnish small quantity kits for touchup painting and for painting other small areas.
5. Mix only components specified and furnished by paint manufacturer.
6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

D. Colors: Formulate paints with colorants for reasons of color or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at Site.

2.05 SHOP FINISHES

A. Shop Blast Cleaning: Reference Paragraph, Shop Coating Requirements.

B. Surface Preparation: Provide Engineer minimum 7 days' advance notice to start of shop surface preparation work and coating application work.

C. Shop Coating Requirements:

1. When required by equipment Specifications, such equipment shall be primed and finish coated in shop by manufacturer and touched up in field with identical material after installation.
2. Where manufacturer's standard coating is not suitable for intended service condition, Engineer may approve use of a tie-coat to be used between manufacturer's standard coating and specified field finish. In such cases, tie-coat shall be surface tolerant epoxy as recommended by manufacturer of specified field finish coat. Coordinate details of equipment manufacturer's standard coating with field coating manufacturer.

D. Pipe:

1. Steel and Ductile Iron Pipe:
   a. Prepare steel surfaces in accordance with SSPC SP-6, Commercial Blast Cleaning with a surface profile of 2 to 3 MILS..
      1). Prepare ductile or cast iron surfaces in accordance with NAPF 500-03-04 Abrasive Blast Cleaning with the exception that ALL rust and mold coating be removed. Only tightly adherent annealing oxide may remain. Bituminous coated pipe shall NOT be allow if field painting is required..
      2). Bituminous coated pipe shall NOT be allow if field painting is required.
      3). Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
   b. The surface preparation and application of the primer shall be performed by pipe manufacturer.
   c.
   d. Prior to blast cleaning, grind smooth surface imperfections, including, but not limited to delaminating metal or oxide layers.

PART 3 - EXECUTION

3.01 GENERAL

A. Provide Engineer minimum 7 days' advance notice to start of field surface preparation work and coating application work.

B. Perform the Work only in presence of Engineer or their represenative, unless Engineer grants prior approval to perform the Work in Engineer's absence.

C. Schedule inspection of cleaned surfaces and all coats prior to succeeding coat in advance with Engineer.

D. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect-Architect-Engineer. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations. At

completion of work of other trades, touch up and restore all damaged or defaced painted surfaces.

3.02 EXAMINATION

A. Factory Finished Items:

1. Scheduling Inspection with Engineer before repairing damaged factory finished items delivered to Site.

2. Repair abraded or otherwise damaged areas on factory-finished items as recommended by coating manufacturer. Carefully blend repaired areas into original finish. If required to match colors, provide full finish coat in field.

B. Surface Preparation Verification: Inspect and provide substrate surfaces prepared in accordance with these Specifications and printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.

C. Starting of painting work will be construed as acceptance of surfaces and conditions within any particular area.

D. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.03 PROTECTION OF ITEMS NOT TO BE PAINTED

A. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not specified elsewhere 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.

E. Protect surfaces adjacent to or downwind of Work area from overspray.

3.04 SURFACE PREPARATION

A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition, or as required by this specification, the more stringent requirements shall apply.

1. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Architect-Architect-Engineer in writing of any anticipated problems in using the specified coating systems with substrates primed by others.

2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.

3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning per SSPC SP-1. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

4. Abrasives for blasting shall be sharp, washed, salt free, angular, and free from feldspar or other constituents that tend to breakdown and remain on the surface.

5. Concrete floors shall be dry as indicated by testing in accordance with ASTM D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

B. Field Abrasive Blasting:

1. Perform blasting for items and equipment where specified and as required to restore damaged surfaces previously shop or field blasted and primed or coated.

2. Refer to coating systems for degree of abrasive blasting required.

3. Where the specified degree of surface preparation differs from manufacturer's recommendations, the more stringent shall apply.

C. Metal Surface Preparation:

1. Where indicated, meet requirements of SSPC Specifications summarized below:

a. SP 1, Solvent Cleaning: Removal of visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants by cleaning with solvent.

b. SP 2, Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using nonpower hand tools.

c. SP 3, Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using power-assisted hand tools.

d. SP 5, White Metal Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter by blast cleaning.

e. SP 6, Commercial Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 33 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.

f. SP 7, Brush-Off Blast Cleaning: Removal of visible rust, oil, grease, soil, dust, loose mill scale, loose rust, and loose coatings. Tightly adherent mill scale, rust, and coating may remain on surface.

g. SP 10, Near-White Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides: corrosion products, and other foreign matter, except for random staining limited to no more than 5 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.

h. SP 11, Power Tool Cleaning to Bare Metal: Removal of visible oil, grease, dirt, dust, mill scale, rust, paint, oxide, corrosion products, and other foreign matter using power-assisted hand tools capable of producing suitable surface profile. Slight residues of rust and paint may be left in lower portion of pits if original surface is pitted.

i. SP 12, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating: Surface preparation using high- pressure and ultrahigh-pressure water jetting to achieve specified surface cleanliness condition. Surface cleanliness conditions are defined in SSPC SP 12 and are designated WJ-1 through WJ-4 for visual surface preparation definitions and SC-1 through SC-3 for nonvisual surface preparation definitions.

2. The words "solvent cleaning", "hand tool cleaning", "wire brushing", and "blast cleaning", or similar words of equal intent in these Specifications or in paint manufacturer's specification refer to the applicable SSPC Specification.

3. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers' recommendations for wet blast additives and first coat application shall apply.

4. Hand tool clean areas that cannot be cleaned by power tool cleaning.

5. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.

6. Welds and Adjacent Areas:
   a. Prepare such that there is:
      1) No undercutting or reverse ridges on weld bead.
      2) No weld spatter on or adjacent to weld or any area to be painted.
      3) No sharp peaks or ridges along weld bead.
   b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.

7. Preblast Cleaning Requirements:
   a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
   b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
   c. Clean small isolated areas as above or solvent clean with suitable solvent and clean cloth.

8. Blast Cleaning Requirements:
   a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer's recommendations.
   b. Select type and size of abrasive to produce surface profile that meets coating manufacturer's recommendations for particular primer to be used.
   c. Use only dry blast cleaning methods.
   d. Do not reuse abrasive, except for designed recyclable systems.
   e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.

9. Post-Blast Cleaning and Other Cleaning Requirements:
   a. 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 wipe with a tack cloth.
   b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.

D. Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation:

1. Prepare galvanized steel and nonferrous metal surfaces in accordance with SSPC-SP16 and the coating manufacturer's instructions.

2. Test galvanized surfaces for chromate treatments and remove as required by SSPC-SP 16, or other Engineer approved method.

3. Ensure surfaces are dry.

E. Concrete Surface Preparation:

1. Do not begin until 30 days after concrete has been placed.

2. Meet requirements of SSPC SP 13 and and ICRI 310.2.

3. Remove grease, oil, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent, or other suitable cleaning methods. Remove residual abrasives, dust, and loose particles by vacuuming or blowing with high pressure air.

4. Abrasive blast clean to remove loose concrete and laitance, and provide a ICRI CSP profile as required by paint manufacturer..

5. Secure coating manufacturer's recommendations for additional preparation, if required, for excessive bug holes exposed after blasting.

6. Unless otherwise required for proper adhesion, ensure surfaces are dry Prior to painting. Concrete floors shall be dry as indicated by testing in accordance with ASTM D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method, and, if necessary, ASTM F1869, Measuring Moisture Vapor Emission Rate of Concrete. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

7. If surfaces are found to be sufficiently alkaline to cause blistering and burning off of finish paint, correct this condition before application of paint

F. Plastic and FRP Surface Preparation:

1. Hand sand plastic surfaces to be coated with medium grit sandpaper to provide tooth for coating system.

2. Large areas may be power sanded or brush-off blasted, provided sufficient controls are employed so surface is roughened without removing excess material.

G. Masonry Surface Preparation:

1. Complete and cure masonry construction for 14 days or more before starting surface preparation work.

2. Remove oil, grease, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent washing, or other suitable cleaning methods.

3. Clean masonry surfaces of mortar and grout spillage and other surface deposits using one of the following:
   a. Nonmetallic fiber brushes and commercial muriatic acid followed by rinsing with clean water.
   b. Brush-off blasting.
   c. Water blasting.

4. Do not damage masonry mortar joints or adjacent surfaces.

5. Leave surfaces clean and, unless otherwise required for proper adhesion, dry prior to painting.

6. Masonry Surfaces to be Painted: Uniform texture and free of surface imperfections that would impair intended finished appearance.

7. Masonry Surfaces to be Clear Coated: Free of discolorations and uniform in texture after cleaning.

H. Wood Surface Preparation:

1. Replace damaged wood surfaces or repair in a manner acceptable to Engineer prior to start of surface preparation.

2. Solvent clean (mineral spirits) knots and other resinous areas and coat with shellac or other knot sealer, prior to painting. Remove pitch by scraping and wipe clean with mineral spirits or turpentine prior to applying knot sealer.

3. Round sharp edges by light sanding prior to priming.

4. Filler:
   a. Synthetic-based wood putty approved by paint manufacturer for paint system.
   b. For natural finishes, color of wood putty shall match color of finished wood.
   c. Fill holes, cracks, and other surface irregularities flush with surrounding surface and sand smooth.
   d. Apply putty before or after prime coat, depending on compatibility and putty manufacturer's recommendations.
   e. Use cellulose type putty for stained wood surfaces.

5. Ensure surfaces are clean and dry prior to painting.

6. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.

I. Gypsum Board Surface Preparation: Typically, new gypsum board surfaces need no special preparation before painting.

1. Surface Finish: Dry, free of dust, dirt, powdery residue, grease, oil, or any other contaminants.

J. Galvanized Surfaces: SSPC SP 16.

K. Existing Painted Surfaces to be Repainted Surface Preparation:

1. Detergent wash and freshwater rinse.

2. Clean loose, abraded, or damaged coatings to substrate by band or power tool, SP 2 or SP 3.

3. Feather surrounding intact coating.

4. Apply one spot coat of specified primer to bare areas, overlapping prepared existing coating.

5. Apply one full finish coat of specified primer to entire surface.

6. If an aged, plural-component material is to be topcoated, contact coating manufacturer for additional surface preparation requirements.

7. For ductile iron pipe with asphaltic varnish finish not specified to be abrasive blasted, apply coat of tar stop prior to application of cosmetic finish coat.

8. Application of Cosmetic Coat:
   a. It is assumed that existing coatings have oxidized sufficiently to prevent lifting or peeling when overcoated with paints specified.
   b. Check compatibility by application to a small area prior to starting painting.

9. Perform blasting as required to restore damaged surfaces. Materials, equipment, procedures shall meet requirements of SSPC.

L. Shop Primed Surfaces: Prepare shop-applied prime coats wherever damaged or bare as required by other sections of these Specifications. Clean and touch-up with same type shop primer.

3.05 SURFACE CLEANING

A. Brush-off Blast Cleaning:

1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC SP 7.

2. Abrasive: Either wet or dry blasting sand, grit, or nutshell.

3. Select various surface preparation parameters, such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.

4. Verify parameter selection by blast cleaning a trial area that will not be exposed to view.

5. Engineer will review acceptable trial blast cleaned area and use area as a representative sample of surface preparation.

6. Repair or replace surface damaged by blast cleaning.

C. Solvent Cleaning:

1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods that involve a solvent or cleaning action.

2. Meet requirements of SSPC SP 1.

3.06 APPLICATION

A. General:

1. The intention of these Specifications is for existing and new interior masonry, interior and exterior wood, and metal and submerged metal surfaces to be

painted, whether specifically mentioned or not, except as specified otherwise. Do not paint exterior concrete surfaces, unless specifically indicated.

2. Extent of Coating (Immersion): Coatings shall be applied to internal vessel and pipe surfaces, nozzle bores, flange gasket sealing surfaces, carbon steel internals, and stainless steel internals, unless otherwise specified.

3. For coatings subject to immersion, obtain full cure for completed system. Consult coatings manufacturer's written instructions for these requirements. Do not immerse coating until completion of curing cycle.

4. Apply coatings in accordance with these Specifications and paint manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.

5. Sand wood lightly between coats to achieve required finish.

6. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.

7. Fusion Bonded Coatings Method Application: Electrostatic, fluidized bed, or flocking.

8. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.

9. Water-Resistant Gypsum Board: Use only solvent type paints and coatings.

10. On pipelines, terminate coatings along pipe runs to 1 inch inside pipe penetrations.

11. Keep paint materials sealed when not in use.

12. Where more than one coat is applied within a given system, alternate colors to provide a visual reference showing required number of coats have been applied.

13. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

14. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.

15. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.

16. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in mechanical equipment rooms and in occupied spaces.
    1. Piping, pipe hangers, supplementary steel and supports (except galvanized surfaces.
    2. Heat exchangers.
    3. Tanks.
    4. Ductwork, insulation.
    5. Motor, mechanical equipment, and supports.
    6. Accessory items.
    7. Conduits and fittings (except galvanized surfaces).
    8. Switchgear.

9. Hanger and support (except galvanized surfaces).

17. Provide finish coats which are compatible with prime paints used.

18. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

19. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable. Holiday test coated steel in immersion areas in accordance with NACE International RP 0188-90.

20. Transparent (Clear) Finishes: Use multiple coats to produce glass smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats, unless otherwise indicated.

21. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

B. Galvanized Metal, Copper, and Nonferrous Metal Alloys:

1. Concealed galvanized, copper, and nonferrous metal alloy surfaces (behind building panels or walls) do not require painting, unless specifically indicated herein.

2. Prepare surface and apply primer in accordance with System No. 4 specification.

3. Apply intermediate and finish coats of the coating system appropriate for the exposure.

C. Porous Surfaces, Such As Concrete and Masonry:

1. Filler/Surfacer: Use coating manufacturer's recommended product to fill air holes, bug holes, and other surface voids or defects.

2. Prime Coat: May be thinned to provide maximum penetration and adhesion.
   a. Type and Amount of Thinning: Determined by paint manufacturer and dependent on surface density and type of coating.

3. Surface Specified to Receive Water Base Coating: Damp, but free of running water, just prior to application of coating.

D. Film Thickness and Coverage:

1. Number of Coats:
   a. Minimum_ required without regard to coating thickness.
   b. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.

2. Application Thickness:
   a. Do not exceed coating manufacturer's recommendations.
   b. Measure using a wet film thickness gauge to ensure proper coating thickness during application.

3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:
   a. Perform with properly calibrated instruments.
   b. Recoat and repair as necessary for compliance with Specification.
   c. Coats are subject to inspection by Engineer and coating manufacturer's representative.

4. Visually inspect concrete, masonry, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.

5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.

6. Apply additional coats as required to achieve complete hiding of underlying coats. Hiding shall be so complete that additional coats would not increase the hiding.

3.07 PROTECTIVE COATINGS SYSTEMS AND APPLICATION SCHEDULE

A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.

B. The Finish Schedule on Architectural Drawings addresses walls, floors and ceilings for various buildings Additional requirements are included in the following schedule which addresses structural steel, prefabricated steel trusses, process equipment, pumps, piping and other items.

C. System No. 1 Steel Submerged in Process or Wastewater:

Surface Prep	Paint Material	Min. Coats, Cover
SP 10, Near White Blast Cleaning	High Build Chemical Resistant Epoxy (Flake-Filled preferred). Coal Tar Epoxy is NOT acceptable.	OPTIONAL Shop Primer 2 coats, 8.0 – 12.0 MDFTPC

1. Use on the following items or areas:

   Metal surfaces new and existing below a plane 1 foot above the maximum liquid surface; metal surfaces above the maximum liquid surface that are a part of the immersed equipment; surfaces of metallic items, such as wall pipes, pipes, pipe sleeves, access manholes, gate guides and thimbles, and structural steel that are embedded in concrete.

D. System No. 2 Exposed Metal-: Exterior

Surface Prep	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning with a surface profile of 2 to 3 MILS.	Epoxy Primer- Ferrous Metal	1 coat, 3 to 5 MDFT
	High Build Epoxy	1 coat, 3 to 5 MDFT
	Gloss Polyurethane	1 coat, 2 to 4 MDFT

1. Use on the following items or areas:

Exposed metal surfaces, new and existing located outside of structures and exposed to weather, and the following specific surfaces:

a. Exposed metal surfaces, piping and equipment in the headworks.
b. Exposed process piping above grade and within structures or vaults.

E. System No. 3 Exposed Metal-: Interior

Surface Prep	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning with a surface profile of 2 to 3 MILS	Epoxy Primer- Ferrous Metal	1 coat, 3 to 5 MDFT
	High Build Epoxy	1 coat, 3 to 5 MDFT
	High Build Epoxy	1 coat, 3 to 5 MDFT

2. Use on the following items or areas:

Exposed metal surfaces, new and existing located inside of structures and the following specific surfaces:

c. Exposed metal surfaces, piping and equipment in the headworks.
d. Exposed process piping above grade and within structures or vaults.

F. Buried Steel (Soil Side)–

Surface Prep	Paint Material	Min. Coats, Cover
SP 10, Near White Blast Cleaning	Coal Tar Epoxy	1 or 2 coats, 14.0 – 20.0 MDFT Total

G. System No. 4 Galvanized Metal, Copper, and Nonferrous Metal Alloy Conditioning:

Surface Prep.	Paint Material	Min. Coats, Cover
SSPC-SP 16	Epoxy Primer- Other	As recommended by coating manufacturer, Ext. Topcoat: Gloss Polyurethane 1 coat, 2 to 4 MDFTInt. Topcoat: High Build Epoxy 1 coat, 3 to 5 MDFT

1. Use on the following items or areas:
   a. Galvanized surfaces requiring painting.
   b. After application of System No. 4, apply finish coats as required for exposure.

H. System No. 5 Carbon Steel or Stainless Steel – Atmospheric or Insulated Service:: Ambient or Hot Steel up to 500 degrees F (260 degrees C)

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Multipolymeric-Matrix Coating	2 coats, 5 MDFTPC

1. Use on the following items or areas:
   a. High heat applications for carbon steel or stainless steel.

b. Application surface temperatures from ambient to 1,000 degrees F (537 degrees C).
c. Operating surface temperatures cryogenic to 1200 degrees F (649 degrees F).
d. Self priming, single component.

I. System No. 6 Skid-Resistant- Concrete:

Surface Prep	Paint Material	Min. Coats, Cover
SSPC-SP 13 to achieve ICRI CSP as required by manufacturer	Epoxy Nonskid (Aggregated)	1 coat, 160 SFPG 10 MDFT plus aggregate

1. Use on the following items or areas:
   a. Use on floors per finish schedule except floors within chemical storage and feed areas.

J. Buried Concrete (Soil Side)–

Surface Prep	Paint Material	Min. Coats, Cover
SSPC-SP 13 to achieve ICRI CSP as required by manufacturer	Coal Tar Epoxy	1 or 2 coats, 14.0 – 20.0 MDFT Total

K. System No. 6a – Chemical Resistant Concrete Floor / Secondary Containment

Surface Prep	Paint Material	Min. Coats, Cover
SSPC-SP 13 to achieve ICRI CSP as required by manufacturer	100% Solids Flake-Filled Epoxy Novolac	Manufacturer Recommended Primer – 4.0 to 6.0 mils DFT 2 coats – 15.0 – 20.0 mils DFT

Verify resistance to stored commodities and anticipated traffic load PRIOR to installation.

L. System No. 7 Chemical-Resistant Wall, Heavy-Duty- Concrete and Masonry:

Surface Prep.	Paint Material	Min. Coats, Cover
SSPC-SP 13 to achieve ICRI CSP as required by manufacturer	Epoxy Filler/Surfacer.	1 coat, as required to fill voids and bugholes to provide a continuous substrate
	100% Solids Epoxy Novolac	2 or 3 coats, 10.0 – 14.0 mils DFT Total

1. Use on the following items or areas:
   a. Walls and floors for chemical containment areas..
   b. Walls and floors for chemical storage and feed areas.
   c. Interior base slabs and walls for chemical piping pull boxes and chemical injection vault.

M. System No. 8 Exposed FRP, PVC:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Plastic and FRP Surface	Acrylic Latex Semigloss	2 coats, 2 to 4 MDFTPC

Preparation		

1. Use on the following items or areas:
   a. All exposed-to-view PVC and CPVC surfaces, and FRP surfaces without integral UV-resistant gel coat.

N. System No. 9 Aluminum and Dissimilar Metal Insulation:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1)	Prime in accordance with manufacturer's recommendations	
	Coal-Tar Epoxy	1 coat, 10 MDFT

1. Use on aluminum surfaces embedded or in contact with concrete.

O. System No. 10 Interior Concrete and Masonry Walls, Non-immersion, excluding Floors:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete and Masonry Surface Preparation	Manufacturer Recommended Surfacer or Block Filler	1 coat, as required to fill voids
	Two Component Water Based Catalyzed Epoxy	2 coats, total 5.0 – 8.0 MDFT

1. Use on the following items or areas:
   a. Concrete and concrete block walls, columns and supports.
   b. Concrete ceilings and beams.
   c. Non-corrosive room areas.

P. System No.11 Interior Gypsum Wallboard:

Surface Prep	Paint Material	Min. Coats, Cover
In accordance with Paragraph Interior Gypsum Board Surface Preparation	Latex Primer Sealer Acrylic Latex	1 coat, 1.5 MDFT 2 coats, 1.5 MDFT

1. For interior gypsum wallboard (walls and ceilings).

3.08 COLORS

A. Provide as shown for equipment and appurtenances and designated herein and shown in Piping Schedule.

B. Proprietary identification of colors is for identification only. Selected manufacturer may supply matches.

C. Equipment Colors:

1. Equipment includes the machinery or vessel itself plus the structural supports and fasteners and attached electrical conduits.

2. Paint equipment and piping one color as selected.

3. Paint nonsubmerged portions of equipment the same color as the piping it serves, except as itemized below:
   a. Dangerous Parts of Equipment and Machinery: OSHA Orange.

b. Fire Protection Equipment and Apparatus: OSHA Red.
c. Radiation Hazards: OSHA Purple.
d. Physical hazards in normal operating area and energy lockout devices, including, but not limited to, electrical disconnects for equipment and equipment isolation valves in air and liquid lines under pressure: OSHA Yellow.

D. Pipe Identification Painting:

1. Color code nonsubmerged metal piping, except electrical conduit. Paint fittings and valves the same color as pipe, except equipment isolation valves.

2. Piping Color Schedule: In accordance with Piping Schedule.

3. On exposed stainless steel piping, apply color 24 inches in length along pipe axis at connections to equipment, valves, or branch fittings, at wall boundaries, and at intervals along piping not greater than 9 feet on center.

4. Pipe Supports: Painted light gray, as approved by Owner.

5. Fiberglass reinforced plastic (FRP) pipe, polyvinylidene fluoride (PVDF), and polyvinyl chloride (PVC) pipe located inside of buildings and enclosed structures will not require painting, except as noted or scheduled.

3.09 FIELD QUALITY CONTROL

A. Testing Equipment:

1. Provide magnetic type dry film thickness gauge to test coating thickness specified in mils, as manufactured by Nordson Corp., Anaheim, CA, Mikrotest.

2. Provide low-voltage wet sponge electrical holiday detector to test completed coating systems, 20 mils dry film thickness or less, except zinc primer, high-build elastomeric coatings, and galvanizing, for pinholes, holidays, and discontinuities, as manufactured by Tinker and Rasor, San Gabriel, CA, Model M-1.

3. Provide high-voltage spark tester to test completed coating systems in excess of 20 mils dry film thickness. Unit as recommended by coating manufacturer.

B. Testing:

1. Thickness and Continuity Testing by Contractor:
   a. Measure coating thickness specified in mils with a magnetic type, dry film thickness gauge, in accordance with SSPC PA 2. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.
   b. Holiday detect coatings 20 mils thick or less, except zinc primer and galvanizing, with low voltage wet sponge electrical holiday detector in accordance with NACE RP0188.
   c. Holiday detect coatings in excess of 20 mils dry with high voltage spark tester as recommended by coating manufacturer and in accordance with NACE RP0188.
   d. After repaired and recoated areas have dried sufficiently, retest each repaired area. Final tests may also be conducted by Engineer.

C. Inspection: Leave staging and lighting in place until Engineer has inspected surface or coating. Replace staging removed prior to approval by Engineer. Provide additional staging and lighting as requested by Engineer.

D. Unsatisfactory Application:

1. If item has an improper finish color or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.

2. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.

3. Repair defects in accordance with written recommendations of coating manufacturer.

E. Damaged Coatings, Pinholes, and Holidays:

1. Feather edges and repair in accordance with recommendations of paint manufacturer.

2. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather the edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.

3. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.

F. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting:

1. Engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.

2. Testing laboratory will perform appropriate tests for any or all of following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis.

G. If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non-complying paint; pay for testing; repaint surfaces coated with rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible.

3.10 MANUFACTURER'S SERVICES

A. In accordance with Division 1, Manufacturers' Field Services, coating manufacturer's representative shall be present at Site as follows:

1. On first day of application of any coating system.

2. A minimum of two additional Site inspection visits, each for a minimum of 4 hours, in order to provide Manufacturer's Certificate of Proper Installation.

3. As required to resolve field problems attributable to or associated with manufacturer's product.

4. To verify full cure of coating prior to coated surfaces being places into immersion service.

5. Inspection Reports: Submit written reports to Engineer and Contractor describing inspections made and actions taken to correct nonconforming work. Report nonconforming work not corrected.

6. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of coating systems.

3.11 CLEANUP

A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at end of each day.

B. Upon completion of the Work, remove staging, scaffolding, and containers from Site or destroy in a legal manner.

C. Remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

D. As soon as painting Work is accepted by Contactor, it shall become its responsibility for protection, final cleaning, and tough-up. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color. Repair coating defects in accordance with manufacturer's written instructions.

E. Upon completion of painting work, clean window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

3.12 ONE-YEAR INSPECTION

A. Owner will set date for one-year inspection of coating systems.

B. Inspection shall be attended by Owner, Contractor, Engineer, and manufacturer's representative.

C. Repair deficiencies in coating systems as determined by Engineer in accordance with manufacturer's instructions.

3.13 SUPPLEMENTS

A. The supplements listed below, and following "End of Section," are a part of this Specification:

1. Piping Color Schedule – To facilitate identification of piping in Water Treatment Plants and Pumping Stations follow the Ten states Identification System unless otherwise noted.

2. Paint System Data Sheet (PSDS)

3. Product Data Sheet (PDS)

3.14 STENCILING

A. The Contractor shall supply all materials and labor necessary for stenciling of legends on pipes. The legend shall show the name of the contents. Review by the Architect-Engineer of legends will be required. Names shall be "plainly visible". Arrows showing direction of flow shall also be stenciled on pipes. The legends shall be located not more than 10 feet apart and, in general, at each valve and piece of equipment. The size and location of the legend shall be in general accordance with ANSI A13.1-1981 "Scheme for

the Identification of Piping Systems". All visible piping 6" in diameter and larger shall be color-coded and stenciled. "Stick-on" labels are not acceptable.

3.15 PLASTIC IDENTIFICATION MARKERS

A. All visible piping 3/4" and greater and less than 6" which is accessible for maintenance operations shall be color-coded and identified with semi-rigid plastic identification markers equal to SETMARK Pipe Markers as manufactured by Seton Name Plate Corporation, New Haven, Conn.; T & B/Westline, Los Angeles, California; or equal. Direction of flow arrows are to be included on each marker, unless otherwise specified.

B. Each marker background is to be appropriately color coded with a clearly printed legend to identify the contents of the pipe in conformance with the "Scheme for the Identification of Piping Systems" (ANSI A 13.1 - 1981).

C. For pipes under 3/4" O.D. (too small for color bands and legends), brass identification tags 1-1/2" in diameter with depressed 1/4" high black-filled letters above 1/3" blackfilled numbers shall be fastened securely at specified locations.

D. All electrical conduits, which are accessible for maintenance operations, shall be identified with semi-rigid identification markers similar to those specified above.

E. Each marker background is to be color-coded with a clearly printed legend to identify the conductor. Size of markers and sizes of lettering to generally conform with the "Scheme for Identification of Piping Systems" (ANSI A 13.1 - 1981)

F. Locations for pipe and electrical markers to be as follows:

1. Adjacent to each valve and fitting (except on plumbing fixtures and equipment).

2. Each branch and riser take-off.

3. Each pipe passage through wall, floor and ceiling construction.

4. Each pipe passage to underground.

5. All horizontal pipe runs-marked every 25 feet.

Piping Color Schedule - Water Treatment

Type	Base Color	Bands*
WATER LINES		
Raw or Recycled	Olive Green	
Settled or Clarified	Aqua	
Finished or Potable	Dark Blue	
Service or Nonpotable	Light Blue	Black
Circulating - Hot and Return	Dark Blue	Red
Deionized	Dark Blue	White
Tempered	Dark Blue	Light Gray
CHEMICAL LINES		
Alum or Primary Coagulant	Orange	
Ammonia	White	
Antiscalant	Orange	Blue
Carbon Slurry	Black	
Caustic	Yellow	Green
Chlorine (Gas or Solution)	Yellow	
Fluoride	Light Blue	Red
Acid	Red	
Polymer or Coagulant Aids	Orange	Green
Sodium Bisulfite		
WASTE LINES		
Backwash	Light Brown	
Sludge	Dark Brown	
Sewer (Sanitary, Discharge or Other)	Dark Gray	
Drainage and Vent	**Black	
MISCELLANEOUS ITEMS		
Vacuum	Black	White
Compressed Air	Dark Green	
Natural Gas	Safety Red	
Steam Supply and Return	Safety Red	White
Sample Piping	To match piping sampled	
Electrical Conduit	**Light Gray	
Pumps, Valves, and Compressors	To match piping color it serves	
Low Pressure Air and Blowers	Black	Light Gray

* Banding shall be 6 inches wide at 30-inch c/c.

** When exposed to the building interiors above the basement areas, the color shall match the adjacent finish.

END OF SECTION