

SECTION 09900

PAINTING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Extent of Work: The extent of painting work is shown on the drawings and schedules and as herein specified.
- B. The work shall include painting and finishing of interior and exterior exposed items and surfaces throughout the project, except as otherwise indicated or specified. Surface preparation, priming and coats of paint specified shall be in addition to shop-priming and surface treatment specified under other sections of the work.
- C. The work shall include field painting of all bare and covered pipes and of hangers, exposed steel and iron work and primed metal surfaces of equipment installed under the mechanical and electrical work, except as otherwise specified.
- D. "Paint" as used herein means all coating system materials, including primers, emulsions, enamels, sealers and fillers and other applied materials whether used as prime, intermediate or finish coats.
- E. Paint all exposed surfaces whether or not colours are designated in "schedules", except where the natural finish of the material is obviously intended and specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If colour or finish is not designated the Engineer will select these from standard colours available from manufacturer.

1.02 PAINTING NOT INCLUDED

- A. The following categories of work are not included as part of the field-applied finish work, but are deemed to be as part of the work covered by other sections of these specifications:
 - 1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various sections of metal fabrications, steel doors and similar items. Also for shop-fabricated or factory-built mechanical and electrical equipment or accessories.
 - 2. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory finishing is specified for such items as, but not limited to, finished mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets.

3. Finished Metal Surfaces: Metal surfaces of aluminium, stainless steel and similar finished materials will not require finish painting, except as otherwise indicated.
4. Operating Parts and Labels:
 - a. Do not paint any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan, shafts unless otherwise indicated.
 - b. Do not paint over any code-required labels, or any equipment identifications, performance rating, name or nomenclature plates.

1.03 QUALITY ASSURANCE

- A. Provide finish coats which are compatible with the prime paints used. Review other sections in which prime paints are to be provided to ensure compatibility of the total coating systems for the various substrates.
- B. Applicable Codes and Standards: The Codes and Standards generally applicable to the Work are listed hereinafter:

BS	British Standards.
1615	Anodic Oxidation Coatings on Aluminium.
4800	Schedule of Paint Colours for Building Purposes.
5493	Code of Practice for Protective Coatings of Iron and Steel Structures against Corrosion.
6150	Code of Practice for Painting of Buildings.
- C. Mock-up:
 1. Prepare for the approval of the Engineer sample areas of coatings using materials, methods and workmanship identical to those to be employed on the Work.
 2. Prepare sample areas for each type of painting or coating at locations designated by the Engineer.
- D. Tests: Where there is any question of dryness of surfaces, test surfaces. Test in the presence of the Engineer, with a reliable electronic moisture meter.

1.04 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's specifications, including paint label analysis and application instructions for each material specified.
- B. Samples:
 - 1. Submit samples for the Engineer's review of colour and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor. Provide listing of the material and application for each coat of each finish sample.
 - 2. On 300 mm x 300 mm hardboard, provide samples of each colour and material, with texture to simulate actual conditions. Resubmit each sample as requested until required sheen, colour and texture is achieved.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and labels.
- B. Provide labels on each container with the following information: Name or title of material; manufacturer's stock number and date of manufacture; manufacturer's name, contents by volume, for major pigment and vehicle constituents; thinning instructions; application instructions and colour name and number.
- C. Store paint materials off the ground in covered sheds and take precautions to ensure that workmen and work area are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of painting systems.

1.06 JOB CONDITIONS

- A. Do not apply water-base paints when the temperature of surfaces to be painted and the surrounding air temperature are below 10°C, unless otherwise permitted by the paint manufacturer's printed instructions.
- B. Do not apply paint in rain, fog or mist; or when the relative humidity exceeds 85%, or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.01 MATERIAL QUALITY

- A. Provide the best quality grade of the various types of coatings as regularly manufactured by approved paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best grade product will not be acceptable.
- B. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer and use only within recommended limits.
- C. Provide paints of durable and washable quality. Do not provide paint materials which will not withstand normal washing as required to remove pencil marks, ink ordinary soil, etc., without showing discoloration, loss of gloss, staining or other damage.

2.02 COLOURS AND FINISHES

- A. Surface treatments and finishes are indicated on the drawings and in the schedules of the contract documents.
- B. Prior to beginning work, the Engineer will select colour from manufacturer's colour chips furnished by the Contractor for surfaces to be painted.
- C. Colour Pigments: Pure, non-fading, applicable types to suit the substrates and service indicated.

2.03 MATERIALS

- A. See "schedule" at the end of this Section for material quality requirements.

PART 3 - EXECUTION

3.01 INSPECTION

- A. The Contractor shall examine the areas and conditions under which painting work shall be applied and correct any unsatisfactory conditions which are detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces or conditions otherwise detrimental to the formation of a durable paint film.

3.02 SURFACE PREPARATION

- A. General: Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 - 1. Remove all 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 the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items with workmen skilled in the trades involved.
 - 2. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning. Provide cleaning solvents of low toxicity and a flash point in excess of 38°C. Program the cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly-painted surfaces.
 - 3. Ensure that all precast Panel surfaces to be painted are even, smooth and free from any irregularities, undulations, air gaps, pinholes, etc. Apply a filler material compatible with the approved painting systems to all such surfaces before the application of the paint system
- B. Cementitious Materials:
 - 1. Prepare cementitious surfaces of concrete, concrete block and cement plaster, if any, to be painted by removing all efflorescence, chalk, dust, dirt, grease, oils and by roughening as required to remove glaze.
 - 2. Determine the alkalinity and moisture content of the surfaces to be painted by performing appropriate tests. Do not apply coatings over surfaces where the moisture content exceeds that permitted in the manufacturer's printed instructions.
 - 3. Acid-etch concrete surfaces as required with a 5% solution of muriatic acid or other proprietary cleaner. Wash surfaces with clean water to remove all acid and neutralize with ammonia and rinse; allow to dry.

3.03 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, 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 the application of the materials. Do not stir surface film into the material. Remove the film and, if necessary, strain the material before using.

3.04 APPLICATION

A. General:

1. Apply paint by brush, roller or spray in accordance with the manufacturer's directions. Use brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high pile sheep's wool as recommended by the paint manufacturer for material and texture required. Spray paint uniformly with suitable equipment.
2. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried. Sand between each coat application with fine sandpaper to produce an even smooth surface in accordance with manufacturer's directions.
3. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint until the paint film is of uniform finish, colour and appearance. Give special attention to ensure that all surfaces, including edges, corners, crevices, welds and exposed fasteners receive a film thickness equivalent to that of flat surfaces.
4. Paint surfaces behind movable equipment and furniture in the same way as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
5. Finish exterior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.
6. Omit the first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise specified.

B. Minimum Coating Thickness:

1. Unless otherwise specified, apply each material at not less than the manufacturer's recommended spreading rate, to provide a total dry film thickness of not less than 0.13 mm for the entire coating system of prime and finish coats for 3-coat work.
2. Unless otherwise specified, provide a total dry film thickness of not less than 0.09mm for the entire coating system of prime and finish coat for 2-coat work.

C. Scheduling Painting:

1. Apply the first coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
2. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

D. Prime Coats:

1. Prime Coats: Apply a prime coat to material which is required to be painted or finished and which has not been prime coated by others.
2. Re-coat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat to ensure a finish coat with no brush-through or other defects due to insufficient sealing.

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

3.05 CLEAN-UP AND PROTECTION

A. Clean-up: During the progress of the work remove from the project daily all discarded paint materials, rubbish, cans and rags.

Upon completion of painting work, clean all 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.

B. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damages by cleaning, repairing or replacing and repainting as required.

3.06 SCHEDULE OF PAINTING AND FINISHES

A. Provide the following type of painting:

1. Acrylic Resin Based Paint (Internal): Acrylic resin based paint shall be a textured emulsion decorative paint. The surface preparation and application shall be strictly in accordance with the manufacturer's instructions.
2. Polymeric Paint (External): Polymeric paint for external use where specified shall comprise of one layer of primer, one layer of Acrylic

resin based textured paint and two finishing coats of polyurethane paint first quality. The paint shall be from an approved manufacturer to a color, texture and finish as indicated on the drawings, as specified elsewhere and/or as directed by the Project Manager.

- B. Provide the following painting systems for the various substrates unless otherwise indicated on the drawings. These painting systems are intended for normal and ambient exposure conditions (excluding extreme exposure) and for decorative application. Manufacturer recommendations shall also be considered and Contractor shall prepare his schedule and submit for approval.

1. Exterior Surfaces:

a. External Plastered Walls Surfaces:

Monocouche Finish:

Apply Monocouche finishes from an approved manufacturer/supplier by the Engineer. Submit for the Engineer's approval manufacturer data sheet, test certificates, application procedures and recommendations. Unless otherwise directed by the Engineer, application of monocouche finishes shall proceed in conformance with the manufacturer's instructions and recommendations for the particular application case and substrates. In general, monocouche finishes shall comply with the following requirements:

Monocouche shall comply with the requirements and provisions of the C.S.T.B. French Specification Book No. 26692 (July- August 93).

Monocouche shall have a minimum thickness of 12mm unless otherwise recommended by the Manufacturer and approved by the Engineer.

-Composition: Monocouche shall be composed with the following components: white cement, hydrated lime, sized siliceous sand, selected mineral fillers, specific admixtures. Particle sizes shall vary between 0 to 3.15mm.

-Physical Characteristics:

Coating is hardened at 28 days.

Apparent specific weight: 1600 kg/m³

Dynamic elasticity modulus: 8000 Mpa.

Implementation on Substrates:

Monocouche shall be implemented on the substrates and, in general, in accordance with one of the types of finishes:

- Scraped finish: Apply 1 or 2 passes with an average thickness of 15mm, then straighten and flatten. Allow the coating to harden and scrap the render with an appropriate scraper.
 - Spray or trowelled spray: Apply a first pass of 10mm thick, then straighten and flatten. Spray on a second pass to cover the first one at every point, as soon as the particle doesn't penetrate into the first pass anymore.
- b. Waterproofing behind stone cladding and where required by Contract Documents:

Application of rubber bituminous emulsion coating or (epoxy resin coating system) to buried surfaces of concrete, and external quality emulsion paint to exposed surfaces of concrete as detailed and shown on the Drawings and directed by the Engineer.

Rubber Bitumen Emulsion:

Materials - The rubber bitumen emulsion shall be a water bound emulsion with a minimum 60% total solids content by volume, comprising bitumen with fine particles of rubber. Not less than 10% nor more than 20% of the total solids shall be rubber. The consistency shall be such that it can be applied to the surface by brush at normal temperature.

Application - Before the application of rubberized bitumen emulsion the concrete surfaces shall be thoroughly cleaned and made free from dirt, dust, grease and other extraneous matter and lightly brush dampened immediately prior to application of the emulsion.

The priming coat shall be made up by mixing 0.23 kg of approved powder detergent or the equivalent of liquid detergent, with 45 litres of clean water and adding this to 4.5 litres of emulsion. The priming coat shall be applied at the approximate rate of 9 litres per 30 m².

The second coat consisting of undiluted emulsion shall be applied as soon as the priming coat is dry, at the approximate rate of 9 litres per 15 m².

The emulsion shall be applied by brush, squeegee or spraying strictly in accordance with the manufacturer's instructions, It shall not be applied during or when rain or dust storms are to be expected.

- c. Concrete and Smooth Finish Precast Concrete:
1st Coat - Acrylic emulsion.
2nd Coat - Acrylic emulsion.
- d. Ferrous Metal (Uncoated):
1st Coat - Red Lead Pigmented Primer.
2nd and 3rd Coat - Semi-Gloss Alkyd Enamel.
First coat not required on items delivered shop primed.
- e. Zinc Coated Metal:
1st Coat - Zinc Dust - Zinc Oxide Primer.
2nd and 3rd Coat - High Gloss Alkyd Enamel.

2. Interior Surfaces:

- a. Concrete and Plaster:
1st and 2nd Coat - Interior Latex Emulsion.
- b. Concrete, Plaster in Wet Areas:
1st Coat - Bond Coat.
2nd and 3rd Coat - Chlorinated Rubber.
- c. Grinded exposed concrete floor surfaces:

1st Coat - Sealer
2nd Coat – Epoxy flooring anti-dust paint
3rd Coat - Epoxy flooring anti-dust paint

Epoxy Flooring, anti-dust paint:

Epoxy solvent based abrasion and chemical resistant floor coating shall be applied to flooring as indicated on drawings and directed by the Engineer. Epoxy flooring shall conform to the following requirements:

Characteristics

Epoxy solvent bearing 2-pack cold cured abrasion resistant and dust-proofing coatings, providing high quality protective floor and wall coatings with good mechanical strength and chemical resistance for exterior and interior applications.

The coating system shall partially penetrate through the concrete substrate and bind its particles, safeguarding against crushing to fine dust, under the effect of abrading rolling loads. It shall also form a sealing layer to protect from the deteriorating effects of chemicals, oils and greases, hydraulic fluids, coolants and motor oils, solvents, salts, cleaning detergent solutions and staining substances etc... Coating system shall be non-toxic after drying,

non-yellowing and shall resist heat up to 120°C.

(Epoxy solvent containing type) cross linked with their hardener (such as polyamidoamine) shall be in compliance with the technical requirements of British standards BS 5493 – “Epoxy two pack chemical resistant finishes”

Physical Properties

Pot life not less than	6h
Appearance after curing 1 day	OK
Impact strength (reverse) (ISO 6272) after curing 14 days	min. 160 cmkg
Adhesion (cross hatch test) (ISO2409) after curing 14 days	Rating 0 (according to DIN 53230)
Boiling water test (6h/980 C) after curing 14 days	Rating 0 (according to DIN 53230)

Composition

-Smooth finish	
-Base component cross-linked with its Hardener (such as polyamidoamine), colored	
-Volume solids	approximately 54%
-Total solids, by weight	approximately 74%
-Solid resin, by weight	approximately 34%
-Pigments, by weight	approximately 40%
-Density kg/L	approximately 1.44
-Mixing ratio: component	Hardener to Base 1:4.23 by volume.

The rate of application of the epoxy flooring, number of coats and thickness, including the use of primer shall be determined and recommended by the manufacturer and submitted for the approval of the Engineer. The manufacturer shall determine the thickness in accordance with ASTM C 957 or similar approved standard as to achieve an epoxy flooring free of cracks or damages or failure for a minimum of 5 years under anticipated abrasion applications.

- d. Transparent Finish Woodwork:
1st Coat - Bleached Shellac.
2nd and 3rd Coat - Rubbing Varnish.

Fill open grained wood with approved filler and wipe before first varnish coat.

- e. Ferrous Metal (Uncoated):
1st Coat - Red Lead Primer.
2nd Coat - Enamel Undercoat
3rd Coat - Semi-gloss Enamel.
- f. Zinc Coated Metal:
1st Coat - Zinc Dust-Zinc Oxide Primer.
2nd Coat - Enamel Undercoat
3rd Coat - Semi-gloss Enamel.

- C. Sand Cement Render Paint : Sand cement render paint shall be of "Patina" type paint. The intended sand cement render paint shall be of Acrylic emulsion type that renders old patina and fancy decorative finishes of high performance and durability with high resistance to alkalinity of concrete, in addition to its properties of perfect adhesion, ease of application, non-toxicity & retention of colour under repeated washability.

Surfaces must be solid, clean, dry, and free from oils, efflorescence, and other contaminants. Concrete and masonry surfaces shall be levelled up before prior to application of sand cement render finish. All blow holes, crevices, and irregularities shall be filled properly. High alkaline and acid surfaces should be cleaned and neutralized. Newly laid concrete should be allowed to become fully cured.

- D. Where surfaces are subjected to extreme exposure and unless otherwise specified provide the following painting systems. Carry out the following applications:

- 1. Uncoated Steel, Ductile and Cast Iron Exposed to Ambient Conditions, or Buried in Ground, Unless Otherwise Specified:
 - Surface preparation by abrasive blasting to Sa 2 1/2.
 - 1st Coat: Two-component zinc rich epoxy polyamide primer to a dry film thickness of not less than 50 microns.
 - 2nd Coat: Amine adduct cured straight epoxy coating to a dry film thickness of not less than 50 microns.

- 3rd Coat: Two-component polyamide cured epoxy high build coating to a total dry film thickness of not less than 100 microns.
 - 4th Coat: Two-component epoxy/polyamide enamel to a total dry film thickness of not less than 40 microns.
2. Uncoated Steel Immersed in Sewage or Subjected to Splashing, Condensation or to Sewage Gases:
- Protective coating as in (1) above.
3. Ductile Cast Iron Immersed in Sewage or Subjected to Splashing, Condensation or to Sewage Gases:
- Surface preparation by abrasive blasting to Sa 2 1/2.
 - Two heavy coats of coal tar epoxy to total dry film thickness of not less than 0.40 mm.
4. Galvanized Steel or Other Galvanized Ferrous Materials Exposed to Ambient Conditions or Buried in Ground, Unless Otherwise Specified:
- 1st Coat: Two-component zinc rich epoxy polyamide primer to a dry film thickness of not less than 50 microns.
 - 2nd Coat: Amine adduct cured straight epoxy coating to a dry film thickness of not less than 50 microns.
 - 3rd Coat: Two component polyamide cured epoxy high build coating to a total dry film thickness not less than 100 microns.
5. Galvanized Steel or other Galvanized Ferrous Material Immersed in Sewage or Subjected to Splashing, Condensation or to Sewage Gases:
- Protective coating as in (4) above except that the 3rd coat shall have a total dry film thickness of not less than 300 microns.
6. Stainless Steel Exposed to Ambient Conditions:
- No protection required.
7. Stainless Steel Buried in Ground:
- Bituminous primer coat not less than 0.15 mm thick.
 - Wrapping with heavy duty self adhesive, rubber bitumen compound with PVC carrier strip. The thickness of the rubber bitumen compound shall not be less than 0.9 mm and that of PVC carrier not less than 0.75 mm thick.

8. Aluminium:
 - Heavy anodic coating.
 - Aluminium shall not be used in buried-conditions.
9. Concrete Surfaces Below Finished Grade Level:
 - Water proofing membrane as shown on drawings and specified.
10. Internal Concrete Surfaces Immersed in Sewage, or Subjected to Splashing or to Sewage Gases:
 - Unless otherwise shown on drawings or elsewhere specified protection shall be as follows:
 - Surface preparation by etching or other means.
 - Two heavy coats of coal tar epoxy to a total dry film thickness of not less than 0.70 mm.
11. Internal Concrete Surfaces of Blended Water Storage Tanks: 2 coats Type 2-Polyamide cured epoxy.

**** END OF SECTION ****