

SECTION – XI
PAINTING AND POLISHING WORK

1.0 INDIAN STANDARDS

1.1 Indian and other international standards followed for this section shall be as listed below. In case of any discrepancies or ambiguities noticed shall be brought to notice of the architect and clarification/confirmation sought. His decision shall be final. However as general rule more stringent specifications shall be followed.

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| 1.2 | 1) | IS 345 | Specification for wood filler, transparent, liquid. |
| | 2) | IS 533 | Specification for gum spirit of turpentine (oil of turpentine) |
| | 3) | IS 1477 | Code of practice for painting of ferrous metals in buildings |
| | | Part I | Pretreatment |
| | | Part II | Painting |
| | 4) | IS 2388 | Code of practice for finishing of wood and wood-based materials |
| | | Part I | Operation and workmanship |
| | | Part II | Schedule |
| | 5) | IS 2524 | Code of practice for non-ferrous metals in building |
| | | Part I | Pretreatment |
| | | Part II | Painting |
| | 6) | IS 3537 | Specification for ready mixed paint, finishing, interior, for general purposes to IS colours |
| | 7) | IS 4597 | Code of practice for finishing of wood and wood-based products with nitrocellulose and cold catalysed materials. |
| | 8) | IS 6005 | Code of practice for phosphating of iron and steel. |
| | 9) | IS 2395 | Code of practice for painting of concrete, masonry and plaster surface. |

1.3 Quality Assurance

1.3.1 Contractor shall provide and use product of single manufacturer in each paint system unless it is advised by the paint manufacturer.

1.3.2 Paint shall not contain compound harmful for health and banned by the authorities.

1.3.3 Paint used shall be of approved make and conforming to IS requirements.

1.3.4 Contractor shall engage applicator with minimum three years experience.

1.4 Submittals

- 1.4.1 Contractor shall submit product data of each product and cross reference to specific paint system suggested in IS code of practice.
- 1.4.2 Submit colour chart identifying paint system to be applied to each area.
- 1.4.3 Prepare one sample of each paint system on timber / plywood. Step back each coat and process to show bare substrate, each coat and process in system build up.
- 1.4.4 Applicators experience certificate.
- 1.4.5 Manufacturers confirmation that it meets IS requirements and his application instructions.
- 1.5 Warranty
Contractor shall submit written warranty for
 - a) Free from defects material and workmanship
 - b) To repair and replace defects occurring during warranty period.
 - c) Defects include but not limited to pin holes, crazing, loss of adhesion to substrate, deficient thickness, bleed-through, improper material, defective material and workmanship.

2.0 MATERIALS

- 2.1 Paints used in the works shall conform to the respective IS or equivalent, other international standard (if specially specified) and code of practices. These shall be the latest revised.
- 2.2 Paints should be such as to withstand weathering effects of the atmosphere, decay of wood, corrosion of metal and of pleasing appearance. Also their surface should become hygienic, clean and attractive.
- 2.3 All paints and finishes shall confirm and subjected to test as per IS or International standards at least for following
 - a) Uniform film applicability with self leveling properties.
 - b) Inert to weathering, accelerated weathering and oxidation
 - c) Fading, colour fasteners, hard and durable surface.
 - d) Bending and scratching resistances.
 - e) Resistance to mould, fungus and algae.
 - f) Chemical analysis (particularly anticorrosive paints).
- 2.4 Thinners and tints used shall be of same manufacturer of approved paint brand or as recommended and approved by him for use with his products.
- 2.5 Shellac, turpentine, patching and other similar materials required for execution of work shall be pure, best quality products.
- 2.6 Product shall have an integral inhibitor added during manufacturing process for protection against fungus, algae and for mildew.

2.7 Varnishes shall conform to the respective latest revised IS. Varnishes shall create a brightening appearance on wood, brilliancy to the painted surface and offer protection against atmospheric action.

2.8 Good varnishes should achieve the following :

1. Render glossy / matt finish to the surface as specified.
2. Have an uniform, pleasing appearance on rapid drying.
3. Its colour should not fade.
4. Most ensure a final hard, durable and tough surface.

2.9 Delivery

Material received at site shall have proper labels of approved manufacturer of paint / varnishes / polish, batch no, date, type and colour.

2.10 Storage

2.10.1 Paint / Varnishes / Polish shall be store in well ventilated areas. Required care for prevention of fire shall be taken. Display prominently warning sign.

2.10.2 Manufacturers seals and containers shall not be opened unless same is approved and required for use at site.

2.10.3 Store shall be maintained clean and neat by making sure that all waste, rags, etc. are removed at end of each day.

2.10.4 No container shall be kept open at any time.

2.10.5 Prohibit smoking in store area and arrange fire protection equipment in area.

2.11 Testing

2.11.1 Test required to be carried out as per direction of PM shall done at the cost of contractor.

2.11.2 Samples and literature required shall be submitted to PM by the contractor at no extra cost to contract.

3.0 WORKMANSHIP

3.1 General

3.1.1 Work shall be carried out strictly as per code of practices, recommendations of approved paint / polish manufacturer and direction of PM. For general guidance expectation of PM or as under.

3.1.2 It shall be responsibility of the contractor to finish painting / polishing work in specified system / coats to acceptable finish appearance, texture, thickness shade. Extra coats or extra efforts if any required by him in execution shall not be paid additionally.

3.1.3 Painting / Polishing shall commence only after other trades work has been substantially completed and areas are cleaned out. Areas shall be maintained in clean condition during painting / polishing.

3.1.4 Surfaces to receive paint / polish finish shall be cleaned and prepared as per code of practice and as recommended by paint / polish manufacturer to

approval of the PM. It shall include required cleaning, sundries, touching, filling, priming, etc. Surfaces to be painted shall be perfectly clean and dry.

If surfaces are not in satisfactory condition for cleaning, sanding, speckling etc. it shall be reported to the PM in writing.

- 3.1.5 All adjoining areas, surfaces shall be protected with temporary protection to prevent damage from droppings, spray, windblown particles, etc.
- 3.1.6 Surfaces to receive finishes shall be dry, free from condensation, any extraneous matter and accepted by PM.
- 3.1.7 The contractor shall make good, at no additional expense to the Employer, any failure or damage to appearance due to the substrate not being completely ready for paint / polish application and substrate being rough or unsuitable by previous tradesmen.
- 3.1.8 Paint / Polish shall not be applied to surfaces where moisture content exceeds 8% when measured with electronic moisture metre or 15% when measured with protimeter.
- 3.1.9 Fitting and fixtures (Ironmongery) fixed to wood or steel shall be removed prior to application of paint or varnish.
- 3.1.10 Follow manufacturers printed and special instructions if any for mixing and application.
- 3.1.11 Scaffolding
The contractor shall provide, erect and remove all the required scaffolding. It should be sufficiently away from surface to work. It should be rigid and safe.
- 3.1.12 Field samples
 - a) Install approved paint system on wall surfaces, other interior and exterior components directed by the PM.
 - b) Prepare and install area about 10 sqm of full surface in required colour, shade, texture, workmanship quality etc.
 - c) Obtain approval of each paint system for colour, texture, quality and workmanship.
- 3.1.13 Pre-installation co-ordination
 - a) Discuss sequence and scheduling, installation procedures with other trade.
 - b) Review requirements and conditions for successful performance.
 - c) Review environmental and ventilation requirements.
 - d) Review surface conditions and acceptability from paint manufacturer's requirements.
 - e) Review project specifications and instructions of PM.

3.2 Surface Preparation

3.2.1 Woodwork

Work shall be carried out to specifications as in IS 2338 Part I and II. The system shall be installed as per the schedule for finishing and shall be as per table of IS 2338 Part II "Schedule for finishing wood or wood based materials".

- a) Wood to be painted / polished shall be seasoned and free from discoloured sapwood and from large resinous or loose knots.
- b) Nail shall be punched well below the surface to provide a firm key for stopping.
- c) Mouldings shall be carefully smoothened with abrasive paper and the fibres left after matching shall be cleaned and removed.
- d) Flat portions shall be smoothened.
- e) Any knot, resinous streaks or bluish sapwood shall be treated with two coats of pure shellac knotting, applied thinly and extended to about 25 mm beyond the actual area requiring treatment.

3.2.2 Ferrous metal surface

Ferrous metal surfaces shall be painted in accordance with IS 1477 Part I and II. Partly or fully pre-fabricated material shall be pre-treated only at the factory with specified primers after the required and controlled surface preparation. The painting system shall be as per table of IS 1477 Part II "Painting Schedule for Ferrous Surfaces".

Preparation of surface

- a) It is most important to prepare the surface as per the various methods detailed in IS 1477 Part I and IS 6005 depending upon the material to be painted / polished and maintained.
- b) Types of method employed are
 - I. Petroleum solvent cleaning
 - II. Trichloroethylene cleaning
 - III. Alkaline cleaning in process tank
 - IV. Emulsion cleaning
 - V. Electrolytic and steam cleaning
 - VI. Mechanical cleaning (Scraping)
 - VII. Flame cleaning
 - VIII. Sand-blasting or shot blasting
 - IX. Chemical cleaning (Pickling)
- c) The best methods shall be used at the respective locations :
 - I. All structural steel shall be sand or shot blasted at site.

II. All pre-fabricated and primed materials shall be mechanically cleaned.

III. All galvanized steel products shall be cleaned and washed with etching or wash primer

3.2.3 Concrete, masonry and plastered surfaces

3.2.3.1 Work shall be carried out as specified in IS 2395, Part I and Part II. Schedule of painting system to be as per table of IS 2395 Part II.

3.2.3.2 Surface preparation:

- a) Surface shall be cleaned and any existing fungus or mould shall be removed. A coat of fungicidal wash shall then be applied and allowed to dry.
- b) Any cracks, defects in plaster or concrete shall be cut out, made good, cured and allowed to dry. Minor cracks may be filled with suitable filler.
- c) In case of an old surface, previous paints or any other coats, all loose pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease, dirt etc. shall be totally removed prior to any repaint. Any unevenness shall be made good by applying putty, made of plaster of paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry. If a painting system that is the same as the old one is to be installed, then complete removal may not be necessary. They shall be washed and light-sanded as approved by the PM.
- d) Lime mortar plaster shall be left unpainted for the first few months to allow plaster to carbonate, harden and dry thoroughly.
- e) In case of Gypsum plaster it shall be ensured that the surface is either alkaline or neutral and tested in accordance with E-1 as specified in IS 2395 Part I.
- f) In case of masonry, joints shall be brought to a sound condition before the painting operation is started. Brick work painting shall be deferred at least by 3 months.

3.3 Application

3.3.1 Painting

3.3.1.1 The paint system shall be installed as detailed in table of IS 2395 part II "Schedule for painting (New Calcareous Surfaces Interior)" or as specifically instructed in writing by PM along with approval.

3.3.1.2 The painting system to be installed shall be as detailed in drawings / Schedule for painting / BOQ. All paints and products shall be procured from one manufacturer only. The steps for painting operation to be followed are as under:

- a) Primer/Sealer - coat as recommended by the paint manufacturer
- b) Filler/Putty - as many layers as required and approved of PM

- c) Under coats
 - d) Finishing coat or coats
- 3.3.1.3 Paints to be applied shall be spread uniformly over the entire area.
- Paints shall be mixed and stirred thoroughly prior to use. No addition of thinner or water shall be permitted other than the quantity specified by the manufacturer.
- 3.3.1.4 Paint may be sprayed or applied with brush depending upon type of paint used.
- 3.3.1.5 Finishing shall be to the satisfaction of the PM.
- 3.3.1.6 Sufficient time shall be allowed between two coats to ensure that the earlier coat is fully dry prior to the application of the successive coat.
- 3.3.1.7 Application of paint shall be carried out in properly ventilated and dry weather. Schedule for painting (Interior) shall be in accordance with Schedule for painting (New Calcareous surface interiors).
- 3.3.1.8 Application of one coat in one room shall be finished in one operation.
- 3.3.1.9 Distemper shall be prepared by addition of water or thinner as specified that will be sufficient for one coat for a room.
- 3.3.1.10 Filler shall be plaster of Paris or as approved by the PM.
- 3.3.1.11 Cement paints shall be applied over thoroughly wetted surfaces. It is important that painted surfaces shall be sprinkled with water two or three times a day for 7 days.
- 3.3.1.12 Brushing of paints in coats shall be in a direction that is at right angles to the previous one. No brush mark must be visible.
- 3.3.1.13 Painting shall be measured in square metres.
- 3.3.1.14 The number of finished coats specified in the BOQ are the minimum required and for guidelines only. The finished surface shall be to the acceptance and approval of the PM. Any additional coats required to achieve this shall be to the account of the contractor and no extra charges shall be payable for any additional coat applied.
- 3.3.1.15 Other general points and steps to be followed are
- a) Surfaces shall be painted when their moisture content is within manufacturers recommended level.
 - b) Paint shall be applied evenly and thoroughly using clean brushes, spraying machines, tools, plants etc. They shall be maintained and serviced as specified therein. All materials shall be applied by skilled tradesmen.
 - c) Each succeeding coat of paint shall differ slightly in colour from the preceding coat.
 - d) Specified coat of paint should be completed on an entire floor or area at a time.

- e) Apply materials at rate not exceeding that recommended by paint manufacturers for surface being painted.
- f) Drying time between coats shall be as per manufacturer's recommendations.
- g) To remove visible defects from 1.5 m distance on the surfaces, clean with approved solvent between coats.
- h) Finish coats shall be smooth, free of brush marks; streaks, laps or pile cap of paint skipped or missed area.
- i) Only after inspection of completed coat, additional coats if necessitated shall be applied. Number of coats applied shall be determined by considering inspected coats of paint.
- j) Minimum dry film thickness should not be less than that specified. It shall be recorded by wet film thickness gauge after application of each coat.
- k) Make edges of paint adjoining other materials or colours clean and sharp without overlapping.
- l) Where surfaces are specified to receive factory applied primer compatible with finish coats, primer coats may be omitted.
- m) Back prime exterior and interior finish carpentry and joinery with material specified for prime coats, without runs on face finish cut edges just prior to installation.
- n) Entire surface (Wall or portion) shall be refinished to nearest internal or external corners if portion of finish is damaged or unacceptable.
- o) Paint systems and/or materials offered for approval shall comply with the minimum dry film thickness requirements specified therein. Paints shall be factory mixed and blended ready for use, except for stirring.

3.3.2 Finishing to wood surfaces

3.3.2.1 Filling

- a) Filler conforming to IS 345 shall be used to level off, to make smooth, to prevent the excessive penetration of the finish and to fill the open cells,
- b) For special stain effects colour fillers shall be used.
- c) On fine textured woods having minute pores that do not require filling, thin varnishes, lacquer or shellac may be used.
- d) Filler or stain filler shall be applied by hand using hessian or jute rags cross the grain. The filled surfaces shall be dried preferably overnight and smoothened with abrasive paper.

3.3.2.2 Staining

- a) Staining of wood shall be restored to create special effects for subsequent clear finish.

- b) Stains used shall be water-based, spirit-based, or oil-based as approved by the PM according to the purpose and location.
- c) Surfaces shall be kept scrupulously clean and free from greasy finger marks.
- d) Small cracks or nail holes shall be stopped with fine plaster of Paris or suitable stopping.
- e) Stains may be applied by brushing and wiping or spraying. Application shall be liberal but without over-staining that may spoil the stained surface.

3.3.2.3 Sealing

A suitable seal shall be applied on the filled and sanded surface to prevent absorption by the wood of successive coats of finish and to seal stain and filler and thus preclude their bleeding into the finished coat.

When fully dry, the surface shall be sanded taking care not to cut through at corners and edges. Dust shall be blown off and the surface wiped with a clean rag.

3.3.2.4 Varnishing

- a) Surfaces to be varnished shall be prepared to produce a smooth, dry, matt surface.
- b) Previous coats or stains, if any, shall be allowed to dry and rubbed down lightly, wiped off and allowed to dry.
- c) Varnish shall be applied liberally with a brush and spread evenly over a portion of the surface with short, light strokes to avoid frothing.
- d) Excess varnish should then be scraped out of the brush and the first section be crossed, recrossed and then laid off lightly. Too much or too little varnish left on the surface will mar the appearance of the finish. Once the varnish begins to set, it shall not be retouched. If there is any mistake, the varnish shall be removed and redone.
- e) Sufficient time shall be allowed in subsequent coats for the previous coat to harden and dry.

3.3.2.5 Clear finishes for wood surfaces

Clear finishes shall be applied to wood and wood based interior surfaces. They shall be carried out as per IS 2338 part I. The schedule of finishes shall be as per table of IS 2338 part II "Schedule for finishing wood or wood based materials".

3.4 French polish

- 3.4.1 Work shall be carried out to IS 2338 Part I and Part II. Schedule of finishes shall be as per table of Schedules for finishing wood or wood based Materials.

3.4.2 Pure shellac varying from pale orange to lemon yellow colour, free from resin or dirt shall be dissolved in methylated spirit at the rate of 0.15 kg of shellac per litre of spirit. Suitable pigment should be added to get the required colour.

3.4.3 All unevenness shall be rubbed down to smoothness with sand paper and the surface shall be well-dusted. The pores in wood shall be filled up with filler made of a paste of whiting dissolved in water or methylated spirit. Otherwise the French polish will get absorbed and a good gloss will be difficult to obtain.

3.4.4 A pad of woolen cloth covered by a fine cloth should be used to apply the polish. The pad shall be moistened with polish and rubbed hard on the surface in a series of overlapping circles so that the polish is applied uniformly over the entire area to give it an even surface. The surface shall be allowed to dry and the remaining coats applied in the same way.

To finish off, the pad shall be covered with a fresh piece of clean cloth, slightly damped with methylated spirit and rubbed lightly and quickly with clear motions. The finished surface shall have a uniform texture and high gloss.

3.4.5 Measurements shall be in square metres with respective factors as specified in SP 27.

3.5 Ferrous metal surface

3.5.2 Primer coat

Immediately after the preparation of the surface, the first coat of primer by spray or brush shall be applied ensuring continuous film without "holidays". After the first coat is hard dry, the second coat shall be applied so that a film free from "holidays" is obtained.

3.5.3 Filler coat

After the second coat of primer is hard dry, the surface shall be rough sanded without scratching or damaging primer. Dents shall be filled with a putty knife pressing firmly into the dents and applying an optimum layer. The coat shall be allowed to hard dry and cut down by wet rubbing to a smooth finish. As many coats of filler as required shall be applied but each layer must be allowed to hard dry and rubbed smooth.

After the last coat of filler is hard dry and wet rubbed, a coat of filler by brush or spray to fill the fine dents shall be applied as required.

3.5.4 Undercoats

The entire surface shall be wet rubbed cutting down to a smooth uniform surface. The water shall be allowed to evaporate. An optimum coat of undercoating by brush or spray, shall be applied with minimum brush marks. The film shall be allowed to hard-dry, and then wet-rubbed, cutting down to a smooth finish (ensuring that at no place shall the undercoat be completely removed).

3.5.5 Finishing coat

The first finishing coat shall be applied by brush or spray and allowed to dry.

Then the gloss shall be gently removed from the entire surface. The surface will be dusted and the second finishing coat applied by brush or spray. Schedule of painting for finishing ferrous surface for interiors shall be in accordance with table IS 1477 Part II "Painting Schedule for Ferrous Surfaces".

3.5.6 Work shall be measured in square metres with respective factors as specified in SP 27.

4.0 POINTS TO BE NOTED

4.1.1 Scaffolding

The contractor shall provide, erect and remove all the required scaffolding. It should be sufficiently away from surface to be easy to work. It should be rigid and safe.

4.1.2 Painting equipment

All the Brushes, Spraying Machines, Tools, Plants, etc. used shall conform to their respective code of practice. They shall be maintained and serviced regularly as specified therein.

4.1.3 Paints

The paints used shall be procured from one manufacturer for the system installed. They shall conform to Indian Standards as specified in the various table of Schedule for finishes in IS Codes.

4.1.4 Drying time

It is essential that each coat shall be thoroughly dry before the subsequent coat is applied.

4.1.5 Flatting down

Flatting down of primer coat, undercoat, and the first finished coat is essential to provide a key for the subsequent coats in order to improve the inter-coat adhesion.

4.1.6 Mixing before application

Paint shall be applied only after the content of the drum are thoroughly stirred. Paint, while in use, shall also be stirred from time to time to ensure that the pigment remains in suspension.

4.1.7 Thinner/dilutions

Paint manufactured to IS shall have correct consistency and shall not require any further dilution. If there is doubt, the viscosity of the paint may be checked. If slight adjustment to the viscosity is necessary, use the thinner as recommended by the manufacturer of the paint.

4.1.8 Environment

Painting operation should be carried out in a well-ventilated place, free of dust, draught and direct sunlight. In coastal regions and areas with moderate or high humidity, it is generally not safe to paint exteriors in the early morning hours. Painting during the monsoon shall be avoided both in the exterior and interior, as humidity is high which will effect the drying, resulting in paint defects.

4.1.9 Surface

Paint surface should be clear of dust, grease, oil, alkalinity, fungus and surface should be totally dry.

4.1.10 Finishing

Paint coats and systems specified are for guidance. Finishing shall have to be carried out to the entire satisfaction of the PM. If any defects are noticed later, the contractor shall repair the same or re-install his complete system as required under the contract. Additional coats, if required, shall be carried out over the minimum specified finish to the approval of the PM, and shall be at the cost of the contractor and no additional charges shall be payable.

5.0 RATE

The rate shall include the cost of all materials, labour, scaffolding, and protective measures involved in all operations described in workmanship and of the item of the BOQ. It shall also include, unless otherwise stated, conveyance, delivery, handling, unloading, storing, waste, return of packing, etc.

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