IS 2338-1 (1967): Code of practice for finishing of wood and wood based materials, Part 1: Operations and workmanship [CED 13: Building Construction Practices including Painting, Varnishing and Allied Finishing]

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Indian Standard

CODE OF PRACTICE FOR FINISHING OF WOOD AND WOOD-BASED MATERIALS

PART I OPERATIONS AND WORKMANSHIP

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Indian Standard

CODE OF PRACTICE FOR FINISHING OF WOOD AND WOOD-BASED MATERIALS

PART I OPERATIONS AND WORKMANSHIP

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CODE OF PRACTICE FOR FINISHING OF WOOD AND WOOD-BASED MATERIALS

PART I OPERATIONS AND WORKMANSHIP

0. FOREWORD

0.1 This Indian Standard (Part I) was adopted by the Indian Standards Institution on 28 June 1967, after the draft finalized by the Painting, Varnishing and Allied Finishes Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 With a view to provide guidance with regard to the finishing work of wood and wood-based materials the Indian Standards Institution is bringing out the Indian Standard code of practice for finishing of wood and wood-based materials (IS : 2338) which is being published in two parts. This part [IS : 2338 (Part I)-1967] deals with operations and workmanship in finishing of wood and wood-based materials. The second part deals with the painting schedules.

0.3 Wood and wood-based materials are finished for decoration and for protection. The finishes used are of two types, namely, opaque and transparent. Opaque (pigmented) coatings or paints conceal the grain and colour of the substrate and substitute in their place a surface of an entirely different colour and texture. Transparent finishes, on the other hand, bring out the grain and colour of the substrate, thereby enhancing its inherent beauty.

0.3.1 Protection furnished by wood finishes is mainly a matter of retarding the absorption and subsequent drying out of moisture from the finished surfaces. By retarding the passage of moisture into the wood, the finish minimizes changes in dimensions and often in shape. The durable film of a surface finish may also provide protection against spotting and discolouration caused by dust, gases, grease or handling. To a limited extent it take up abrasion resulting from hard usage.

0.3.2 Finishes as a rule do not protect wood from biological decay. Oviposition by some wood boring insects is prevented by a continuous film of the finish.

0.4 In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country. This has been met by deriving assistance from the following

publications:

N.Z : S.S.CP 5 Code of practice for painting. New Zealand Standards Institute.

B.S. CP 231 : 1952 Painting. British Standards Institution.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part I) deals with operations and workmanship for the finishing of wood and wood-based materials with the pigmented and clear finishes.

1.1.1 In this standard clear finishes, such as nitro-cellulose, polyester, polyurethene, acid catalysed cold cure amino-plast and similar type of finishes are not covered.

2. TERMINOLOGY

2.1 For terms relating to paints and allied materials reference may be made to IS : 1303-1963†.

2.2 For terms relating to wood and wood-based materials reference may be made to IS : 707-1958‡.

3. NECESSARY INFORMATION

3.1 For the efficient application of finishes on wood and wood-based materials the following information is necessary and shall be furnished to the person in-charge of the work:

a) The type of wood and wood-based materials; the nature of their pretreatment, namely, preservation, seasoning, etc;

b) The location of the member to give an idea of the extent of exposure to weather;

c) The type of finish to be applied, pigmented, clear, etc;

d) Information on the nature of previous finish would be desirable for re-decoration; and

e) Atmospheric conditions in the locality, namely, temperature, humidity, incidence of sunlight, etc.

*Rules for rounding off numerical values (*revised*).
†Glossary of terms relating to paints (*revised*).
‡Glossary of terms applicable to timber, plywood and joinery.

3.2 Necessary drawings and instructions shall also be furnished to the person in-charge of the work.

3.3 Arrangement shall be made for proper exchange of information between those engaged in wood finishing work and those whose work will affect or will be affected.

4. GENERAL CHARACTERISTICS OF WOOD AND WOOD-BASED MATERIALS

4.1 The decorative and protective value of a finish may be influenced by the nature of the surface on which it is applied. There are several species of wood and an increasingly large number of wood-based panel products often differing from each other in surface characteristics. They may be hard, soft, resinous or porous in varying degrees.

4.1.1 Wood is a hygroscopic material and tries to reach a state of equilibrium with the atmosphere in so far as its moisture content is concerned. Changes in moisture content are accompanied by swelling and shrinkage, which is most pronounced across the grain of the wood. Due to moisture movement the summerwoods swell to a greater extent than springwoods and this sets up stress-concentration at the sharply defined junctions between one year's summer growth and the next year's spring and the failure commences about this region. The resulting stresses on the film of finishing material are such as to cause fissures to develop along the grain under adverse circumstances.

4.1.2 Before painting, wood shall be properly seasoned and the moisture content shall be brought as near as possible to the equilibrium moisture content as given in IS : 287-1960* so as to prevent uneven shrinkage during drying which may result in distortion or even in cracks in the paint finish. It is also advisable not to finish excessively dry wood.

4.1.3 The cellular structure of wood has a strong influence on the absorption of liquid components of finishes. Non-uniform absorption of vehicle by the wood upsets pigment-binder ratio, impairing the appearance and life of the coating.

4.1.4 Plywood, blockboard, hardboard and particle board have greater dimensional stability than solid wood and provide more uniform surface for finishing.

4.1.5 The trade and botanical names of different Indian timbers are given in IS : 399-1963†. The painting characteristics of some of the soft and hardwoods are given in Appendix A.

*Recommendations for maximum permissible moisture content of timber used for different purposes for different climatic zones (*revised*).

†Classification of commercial timbers and their zonal distribution (*revised*).

5. DESIGN CONSIDERATIONS

5.1 Design and Detailing of Joinery Timber — Since water can find access through unpainted surface or joints and may encourage decay, in all cases where the wood surface is in contact with surfaces which are likely to get wet, such as brickwork or concrete, one or two priming coats shall be applied to wood surfaces before fixing to minimize absorption of water. Special attention is drawn to the following:

a) Window and door frames, flush with the wall face may allow ingress of moisture between the structural walling and the woodwork, and the paint is then likely to fail unless two prime coats are applied to the surface and allowed to dry before fixing.

b) The rails of gates shall preferably be bevelled to shed water and help to prevent it from entering the joints between vertical and horizontal members.

c) Door posts and sash frames resting on steps or sills are liable to absorb water unless the steps or sills are so designed and built as to drain away water. Door posts, sash frames and similar joinery shall be adequately primed all over, taking special care to prime any cut surfaces before fixing.

d) Wherever required, in joinery exposed to weather, tenons and other concealed surfaces shall be primed before assembly. Members shall be assembled while the paint is wet. When surfaces are to be glued, priming may not be possible and hence the use of waterproof glue is recommended. Any painted beads or stops shall be primed on the underside and fixed in position while the paint is wet.

e) In design, consideration shall always be given to the grain direction and the effects of shrinkage, swelling and warping which may tend to open joints and break the paint film. Wide boards shall be fixed centrally or at one edge only, bearing in mind that movement may be sufficient to rupture the paint film or may cause the board, and with it the paint to split if the movement is unduly restrained in fixing. End grain shall receive special care in painting.

5.2 Selection of Coating Materials

5.2.1 *Prime Coat*

5.2.1.1 A suitable wood primer shall adhere firmly to the surface, form a sound foundation for further coating and fulfil special functions, such as acting as a sealer on porous wood and hardboard.

5.2.1.2 Wherever the timber has large pores, a preliminary priming with a quick drying varnish of the gold size type conforming to IS : 198-1952*

*Specification for gold size varnish.

is desirable. The varnish shall be forced with a brush well into the pores so that the pores are completely filled. This filling of the pores shall not be regarded as a substitute for normal priming and shall be followed by a coat of the primer.

5.2.1.3 Pink wood primer (*see* IS : 3536 -1966*) or the mixture of white and red lead primer may be used in painting structures containing a slight excess of moisture as they allow minute quantities of moisture to pass through without disrupting it.

5.2.1.4 Aluminium primer may be used for priming wood having knots and resinous matter. The primer prevents the resin of the wood from bleeding.

5.2.2 *Stoppers and Fillers* — For deep holes, plastic wood conforming to IS : 423-1961† shall be used. Stopping may be generally confined to large holes or cavities. Shallow indentations shall be made up with the paste filler conforming to IS : 426-1961‡. For high class work filling operation shall be done over the whole surface by using the filler conforming to IS : 110-1950§. For clear finishes, filler conforming to IS : 345-1952‖ shall be used.

5.2.3 *Undercoat and Finishing Coat Materials* — Before considering the application of undercoat and finishing coat it shall be made sure that those selected are compatible with each other. If a non-elastic finishing coat is applied over an elastic primer coat it may lead to cracking or alligatoring of the finishing and the primer coat may become visible through cracks in the finishing coat. Similarly, if the finishing coat contains a strong solvent, it may attack the primer coat and lead to shrivelling (wrinkling) of the entire paint structure. It is, therefore, essential to specify and ensure that the various types of paints to be used are compatible with each other, and as Indian Standard specifications on paints allow enough latitude for the manufacturer to adjust his materials, it is advisable to consult the paint manufacturer and obtain his guarantee that the paints purchased not only satisfy the specified requirements but are also compatible with each other. As a general rule, it is safer to use primer and finishing paints made by the same manufacturer.

6. PAINTING NEW WOOD WORK

6.1 Surface Preparation

6.1.1 Wood that is to be painted should be well seasoned and free from discoloured sapwood and from large resinous or loose knots. If the wood is

*Specification for ready mixed paint, brushing, wood primer, pink.

†Specification for plastic wood for joiners filler (*revised*).

‡Specification for paste filler for colour coats (*revised*).

§Specification for ready mixed paint, brushing, grey filler, for enamels for use over primers.

‖Specification for wood filler, transparent, liquid.

not properly seasoned, the surface may become uneven on drying and cracks may also develop. Paint applied over discoloured sapwood is liable to become discoloured; resin from knots tends to exude through the paint. Any such unsound portions should, therefore, be cut out and replaced with sound wood.

6.1.2 Nails should be punched well below the surface to provide a firm key for stopping.

6.1.3 Mouldings should be carefully smoothed with abrasive paper and projecting fibres left after machining should be removed. Quirks need particular attention since paint collects on any rough projections and the finished appearance is then marred.

6.1.4 Flat portions should be smoothed off with abrasive paper used across the grain prior to painting and with the grain prior to staining or if the wood is to be left in its natural colour. Woodwork which is to be stained is sometimes smoothed by scraping instead of by glass papering.

6.1.5 Any knots, resinous streaks or bluish sapwood that are not large enough to justify cutting out should be treated with two coats of pure shellac knotting, applied thinly and extended about 25 mm beyond the actual area requiring treatment. Aluminium primer may be used in the place of shellac knotting. If the area is small and the wood is not highly resinous, it is permissible instead of applying two coats of knotting, to apply one coat slightly pigmented with aluminium powder.

6.2 Priming

6.2.1 If there is dirt or any other extraneous material this shall be removed. If the wood work is not already primed, a priming coat shall be applied. In case there is already a primer coat but an unsatisfactory one, it shall be rubbed down to bare wood and the surface reprimed. Primer shall be applied by brushing.

6.2.2 Care shall be taken to prime not only the surface of the wood that will be visible after fixing but also any surface which will be in contact with materials, such as brickwork or concrete from which the wood may absorb moisture. It would be an advantage to give such surfaces a further coat of primer, before fixing.

6.2.3 Unless specified otherwise, all joinery work which is intended to be painted shall receive at least two priming coats. It is particularly important that end grains be so treated and, if it is necessary to cut the joinery before fitting, all cut ends shall be painted with two priming coats.

6.3 Stopping and Filling — Stopping and filling should be done after priming. If the surface is not first primed, the filler or stopping may shrink and fall away, owing to absorption of some of the binder.

6.3.1 Stopping is made to the consistency of stiff paste and is used to fill holes and cracks, while the function of the filler is to level up slight irregularities of surface. Filler is usually applied with a putty knife and is subsequently rubbed down to a level surface with abrasive paper, pumice stone or other suitable abrasive. For certain work, fillers are mixed to the consistency of thick paint and applied with a brush.

6.3.2 The filler coat should be of an optimum thickness and should be allowed to fully harden and flatten before subsequent coat is applied. Apply as many layers as necessary allowing the coats to harden and flatten between coats.

6.4 Application of Undercoat — Undercoat shall be applied after the surface has been primed, stopped, filled and rubbed down to a smooth surface. Undercoat may be brushed or sprayed. After drying the coat shall be carefully rubbed down and wiped clean before the next coat is applied.

6.5 Finishing — The application of finishing paint varies according to the type of paint employed. Cleanliness is essential and as far as possible the application should be carried out in normal dry conditions. The finishing coat may be applied either with the brush or sprayed.

7. APPLICATION OF CLEAR FINISHES

7.0 General — Clear finishes for wood are generally used for interior surfaces as their durability when used on external surfaces is less than that of pigmented coating. This is mainly because of the destructive action on the clear finishes by the ultraviolet rays present in the sunlight. The ultraviolet radiation is to a great extent absorbed by the pigments present in the coatings while it may cause considerable damage to clear finishes.

7.1 For the application of clear finishes the following procedure shall generally be adopted:

a) Filling,
b) Staining,
c) Sealing, and
d) Finishing.

7.2 Filling

7.2.1 The primary function of fillers is to fill the opened cells of the wood in the surface layer. This is necessary to prevent the excessive penetration of the finish, that is, subsequently applied and to level off the surface of a porous wood to make a smooth top finish possible.

7.2.2 On hardwood with large open vessels a suitable filler conforming to IS : 345-1959* may be used.

7.2.3 For special stain effects coloured fillers shall be used.

7.2.4 A combination of filler and stain may be used for reasons of cost, that is, to eliminate a separate staining operation. However, the result lacks the grain and colour contrast characteristic of wood stains.

7.2.5 On fine-textured woods having minute pores that do not require filling, unfilled drying oils, thin varnishes, lacquer or shellac may be used.

7.2.6 Filler or stain filler shall be heavily applied to the wood surface by hand, using hessian or jute rag across the grain. It may be rubbed when still wet to get better penetration. After 5 to 10 minutes it shall be wiped off by hand across the grain followed by a light wipe with the grain. Picking out of corners and carvings may be done with a rag wrapped around the end of a sharpened wood dowel. The filled surface shall be dried preferably overnight, and smoothened with abrasive paper. Wipe with a clean soft rag to remove dust and nibs.

7.3 Staining

7.3.1 Staining of wood may be resorted for indoor fittings and even then only for subsequent clear finishes. The object of staining wood is to darken it as part of a decorative scheme. If skilfully carried out, staining may be used with good effect to enhance the natural grain or figuring of the wood.

7.3.2 The depth of colour produced by staining will depend not only on the concentration of the stain but also on the extent to which it is absorbed by the surface. Stain is readily absorbed by soft porous spring-wood but comparatively little by the harder and denser summerwood. Hardwoods, being less absorbent, will present less difficulty; the stain may be applied liberally and allowed to remain until sufficient quantity is absorbed, the excess being then wiped off, if necessary. The effects produced by knots, resinous portions and other markings may be similarly accentuated. The different types of stains as water, spirit and oil stains have different penetrating properties and, therefore, shall be selected to suit the performance required.

7.3.2.1 *Water stains* — Water stains are made with water soluble dyes. They emphasize the grain, especially that of softwoods, since they are readily absorbed by the porous portions but less readily by the denser, more resinous portions. They will raise the grain of the wood thus spoiling the smoothness of the finish if a highly polished effect is required; this difficulty can be overcome by first wetting the surface with water to raise the grain and then, after drying, smoothing it with abrasive paper before staining.

*Specification for wood filler, transparent, liquid.

Where it is necessary to provide a temporary staining treatment on wood, that is, damp or unseasoned, water stain is preferable to other types of stain.

7.3.2.2 *Spirit stains* — Spirit stains are solutions of spirit soluble dyes in industrial methylated spirit. Like water stains, spirit stains penetrate more into the softer portions of the wood and so accentuate the grain but they do not cause the fibres to swell nor raise the grain. They will dry very quickly and shall be applied quickly and skilfully to avoid patchy effects. If applied to damp wood the dyes in the stains are liable to be thrown out of solution. The surface after staining with spirit stains may be finished in the same way as after treating with water stains.

7.3.2.3 *Oil stains* — Oil stains may be solutions of oil soluble dyes in linseed oil but usually, to give a wider range of colours, they consist of insoluble, semi-transparent pigments ground in linseed oil and thinned with turpentine or other solvent. Sometimes wax is added to make the stainless penetrating. Oil stains will give a softer effect than water stains or spirit stains. Generally they may be finished with gloss or flat oil varnish. If wax polished, the stain shall first be given time to dry hard. If applied to damp wood they are likely to develop a milky effect or bloom. The application of oil stains and varnish will retard the drying of the wood. Oil stains will not take well on certain resinous or oily woods, such as teak. Sometimes, these woods are pretreated with solvents to remove the greasy matter from the surface prior to oil staining or varnishing.

7.3.3 *Wash Coating* — If grain raising stains have been employed or if it is desired to reduce to a minimum the risk of stain bleeding into top coats and to prevent discolouration of wood by absorption of oil and stains from the filler, a thin coat of shellac or lacquer shall be applied on the stained surfaces before sanding.

7.3.4 The stain may also be mixed with varnish to produce the combined effect in one operation; the result will, however, not be as satisfactory as when the 'finishing' follows as a separate operation after staining. Alternatively, the stain may also be mixed with wax so that after application in one operation the wax may be polished. Here again the results will not be as satisfactory as in a two stage system.

7.3.5 *Preparation of Wood for Staining*

7.3.5.1 Surface intended for staining shall be kept scrupulously clean and free from greasy finger marks. It shall be prepared by careful smoothing with fine abrasive paper, used in the direction of the grain; scratches across the grain are likely to become stained darker than the rest of the surface and so spoil the finished appearance. If water stain is to be used, the surface of the wood shall be wetted with water to raise the grain and then be allowed to dry before finally smoothing.

7.3.5.2 Small cracks or nail holes may be stopped with plastic wood, fine plaster of Paris or other suitable stopping, if water stain or spirit stain

is to be used. The stopping shall be rubbed down with fine abrasive paper when hard and touched with a little thinned knotting before staining. Where oil stain is to be used, stopping shall preferably be done after staining, using tinted putty or wood filler.

7.3.5.3 If necessary, softwood may be treated with hot weak size before staining to prevent undue absorption of stain, but an excess of size should be avoided. To a certain extent the degree of penetration of a stain may be controlled by pretreatment of the absorbent surface with a hot weak size of thinned shellac varnish. Size shall preferably be not used where the stained surfaces are likely to come into contact with water, which may smear it. To control the depth of colour, however, diluted stain may be made to soak well into the wood. Where size is used, the surface shall be allowed to dry thoroughly before staining. In general, flat surfaces shall be treated first and mouldings and edges last, that is, reversing the order recommended when applying paint, the object being to avoid double staining along the edges.

7.3.6 *Application of Stains*

7.3.6.1 Stains may be applied by brushing, and wiping or by spraying. The stain shall be so thinned that it can be applied fairly liberally without over-staining. Care shall be taken, especially on absorbent softwoods, to apply the stain evenly and without overlapping. Spirit stains, in particular require careful and quick application as they dry very quickly.

7.3.6.2 The stained surface shall be varnished, wax-polished or french polished as required after it has dried. For reasons of economy, the surface shall be sized before varnishing, in which case it is important to allow the size to dry thoroughly. Where a more durable finish is required two or three coats of finishing clear varnish is recommended.

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

7.4.1 Sealer may be sprayed on taking care not to flood the surface. It is allowed to dry hard.

7.4.2 A stain (toner) may be incorporated with the sealer for special colour effects.

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

7.5 Varnishing

7.5.1 Surfaces to be varnished should be prepared to produce a smooth, dry, matt surface. Previous coats of paint or stain, if any, should be allowed to dry and be rubbed down lightly, wiped off and allowed to dry.

7.5.1.1 The operation of varnishing calls for careful attention to cleanliness. All dust and dirt should be removed from the surface to be varnished and also from the neighbourhood. If the surfaces are dampened to avoid raising of the dust, they should be allowed to dry thoroughly before varnishing is commenced. Damp atmosphere and draughts should be avoided. For exterior work, a normal dry day should be chosen. Exposure to extremes of heat or cold or to a damp atmosphere will spoil the work.

7.5.1.2 In handling and applying varnish care should be taken to avoid forming froth or air bubbles. Brushes and containers should be kept scrupulously clean.

7.5.2 *Application* — The varnish should be applied liberally with a brush and spread evenly over a portion of the surface with short light strokes to avoid frothing. It should be allowed to flow out while the next section is being laid-in. 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. The varnish, once it has begun to set, should not be retouched. If a mistake is made, the varnish should be removed and the work started afresh.

7.5.2.1 Where two coats of varnish are specified, the first should be a hard-drying undercoating or flatting varnish; this should be allowed to dry hard and then be flatted down before applying the finishing coat. If two coats are applied, sufficient time should be allowed between coats.

7.5.2.2 When flat varnish is used for finishing, a preparatory coat of hard drying undercoating or flatting varnish should first be applied and should be allowed to harden thoroughly. It should then be lightly rubbed down before the flat varnish is applied. Sections of the work, such as panels, should be cut in clearly, so as to avoid any overlapping during application, as this is likely to impart some measure of gloss to partially dried areas, worked up in lapping. On larger areas, the flat varnish should be applied rapidly, and the edges of each patch applied should not be allowed to set, but should be followed up whilst in free working condition.

8. FRENCH POLISH

8.1 Pure shellac varying from pale orange to lemon yellow colour, free from resin or dirt should be dissolved in methylated spirit at the rate of 0·15 kg of shellac per litre of spirit (*see* IS : 348-1952*). Suitable pigment should be added to get the required colour.

8.2 Preparation of Surface — All unevenness should be rubbed down to smoothness with sand paper and the surface should be well dusted. Fill up the pores in the wood with a filler made of a paste of whiting in water or methylated spirit (with a suitable pigment like burnt sienna or umber,

*Specification for french polish.

if required) otherwise the french polish will get absorbed and a good gloss will be difficult to obtain.

8.3 Application of Polish — A pad of woollen cloth covered by a fine cloth should be used to apply the polish. The pad should be moistened with polish and rubbed hard on the surface in a series of overlapping circles applying the polish sparingly but uniformly over the entire area to give an even surface. A trace of linseed oil on the face of the pad facilitates this operation. The surface should be allowed to dry and the remaining coats applied in the same way. To finish off, the pad should be covered with a fresh piece of clean fine cloth, slightly damped with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface should have a uniform texture and high gloss.

9. FINISHING OF WOOD-BASED MATERIALS

9.1 Plywood — Plywood is similar to solid wood in its finishing characteristics.

9.2 Hard Board

9.2.1 *Painting Characteristics* — Hard board is made up of fibres which are capable of swelling under the influence of oil paints. Tempered hard board may be varnished or painted, if required.

9.2.2 *Treatment* — A suitable treatment to prevent swelling under the influence of oil paints is necessary; one such treatment is to use plastic emulsion paint thinned with water, another is shellac varnish as the first coat and when dry rub down with fine grade glass paper and follow with required undercoating and finishing coats as for solid wood.

9.3 Particle Board — The surface shall be filled with a thin brushable filler and finished as for solid wood.

9.4 Insulation Board — Two thin coats of water-based paints shall be applied by spraying.

9.5 Wood Treated with Preservative

9.5.1 *Painting Characteristics* — Wood treated with the commonly used water soluble preservatives may be painted satisfactorily after it is dried. The life of the coating may, in some instances, be slightly less than it would have been on untreated wood, but the loss in durability is not such as to offer any practical objection to the use of treated wood for purposes where preservation against decay is necessary and the appearance of painted wood and protection against weathering are desired. Coal-tar creosote or other dark oily preservatives tend to bleed through paint unless the treated wood has been exposed to the weather for many months before it is painted.

9.5.2 *Treatment* — Fairly satisfactory results may be obtained on creosoted wood with rough surfaces (sawed or weather-beaten surfaces) by applying exterior water thinned paints, such as case-in paints or resin emulsion paints.

9.5.2.1 Creosote-treated wood shall not be painted with ordinary paint as discolouration of the latter may result. One or two sealing coats of aluminium paint or shellac knotting clear or pigmented with aluminium powder shall be applied before it is finished with other paints.

9.5.2.2 In the case of wood treated with other preservatives, such as copper naphthenate, chlorophenol and zinc silico fluoride, a high quality aluminium primer is desirable.

9.5.2.3 Alternatively, advice may also be sought of the manufacturers of these preservatives for information as to the suitable primer that may be applied over these.

10. INSPECTION

10.1 While the finishing is in progress, inspection shall be made to ascertain that the right type of finishing material is being used, and the number of coats and the sequence of operation are carried out as specified. The points as laid down in **10.1.1** to **10.1.4** shall be specially noted.

10.1.1 As the first signs of failure of paint may not appear until some time after the work has been completed, inspection of work can only be directed towards ascertaining as far as possible that the types of paints and number of coats applied are as specified, and that the standard of work is satisfactory.

10.1.2 The chief points on which the general quality of paint work should be judged by visual inspection are as follows:

a) Uniformity of finish and colour;

b) Uniform and complete obscuration of the ground;

c) Freedom from blemishes (for example, rums, sags, wrinkling, fat edges, entrained paint skins, dust, bare or starved patches and cracks);

d) Freedom from tackiness;

e) Freedom from brush marks and ladders; and

f) General cleanliness and neatness of finish.

10.1.3 Should the paint appear faulty during application any defects in the following properties should be noted and the matter reported to those responsible:

a) Colour,

b) Consistency,

c) Drying time, or

d) General quality of finish.

10.1.4 Since it is the final coat of paint which claims attention it is a common error to blame the paint or workmanship for any defects. These are by no means the only factors which may influence the final result. In attempting to diagnose a paint failure the following details should be ascertained and taken into consideration:

a) Nature, history and condition of the painted surface;
b) Materials used;
c) Climatic conditions before, during and after painting;
d) Technical correctness of work in relation to conditions; and
e) Workmanship.

11. MAINTENANCE

11.1 The principle given in Table 3 of IS : 2338 (Part II)-1967* shall generally be adopted for maintenance work. All unsound work should be burnt off or otherwise removed and brought forward as for new work.

11.2 The surface should be cleaned and rubbed down with pumice stone or abrasive paper. All holes and cracks should be prepared for stopping by touching them up with primer paint, with undercoat paint; when dry, the stopping should be completed with a suitable filler and the appropriate paint as given in IS : 2338 (Part II)-1967* should then be applied.

APPENDIX A

(*Clause* 4.1.5)

PAINTING CHARACTERISTICS OF TIMBERS

A-1. Some of the soft and hard woods given in **A-1.1** and **A-1.2** are resinous or show oily exudation occasionally and hence they require special treatment. In general, hardwoods are porous and require filling. However, some of the hardwoods given in **A-1.3** do not require filling as their pores are less than about 100-microns in diameter or are filled with gum.

A-1.1 The following softwoods are resinous and may exude resin through paint films:

TRADE NAME	BOTANICAL NAME
Chir	*Pinus roxburghii Sargent*
Cypress	*Cupressus torulosa Don*
Deodar	*Cedrus deodara Loudon*
Kail	*Pinus wallichiana A. B. Jacks*
Spruce	*Picea smithiana Boiss*

*Code of practice for finishing of wood and wood-based materials: Part II Schedules.

A-1.2 The following hardwoods may show oily exudation occasionally:

Trade Name	Botanical Name
Gurjan	*Dipterocarpus sp.*
Hollong	*Dipterocarpus macrocarpus Vesque*
Piney	*Kingiodendron pinnatum (Roxb.) Harms.*
White cedar	*Dysoxylum malabaricum Bedd.*

A-1.3 The following hardwoods do not require filling because their pores are less than about 100-microns in diameter or are filled with gum:

Trade Name	Botanical Name
Axlewood	*Anogeissus latifolia wall.*
Birch	*Betula sp.*
Boxwood	*Buzus sp.*
Gardenia	*Gardenia sp.*
Haldu	*Adina cordifolia Hook. F.*
Kaim	*Mitragyna parvifolia (Roxb.) Korth.*
Red sanders	*Pterocarpus santalinus Linn. f.*
Satinwood	*Chloroxylon swietenia DC.*

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