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CBD 90

Coatings for Interior Walls

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H.E. Ashton

Please note

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One of the most common questions raised with regard to painting or repainting interior walls and ceilings of buildings concerns the type of finish to use. The problem is one that applies equally well to the architect drawing up specifications for a new building or the "do-it-yourselfer" contemplating the next long weekend at home. There is no one perfect coating, as is evidenced by the multiplicity of types on the market.

[CBD 78](#) discussed the general composition and properties of the main types of coatings, and [CBD 79](#) described some specific classes. This Digest will outline the different interior grade coatings and the properties that influence their selection for a particular job.

General Factors

Weather resistance is not a factor with interior coatings, and materials that would fail rapidly on exterior exposure can give quite satisfactory service indoors. In many interior locations appearance is more important than protection.

The most visually-evident appearance property is gloss. The higher the gloss, the more the surface reflects like a mirror and the more distinct the image. Four levels of gloss are usually distinguished in coatings: flat, eggshell, semigloss and gloss. A flat or matt finish has no gloss and little sheen, i.e., when viewed along the surface it is not shiny. An eggshell or velvet finish has little gloss, but a fair amount of sheen may be present. A semi-gloss or satin has considerably more gloss, especially when first applied. A gloss finish naturally has the highest amount of gloss. Within these general categories the degree of gloss can vary with different materials, since each manufacturer has his own opinion as to which level is best for a particular product.

It is possible to produce different levels of gloss with various binders, although the range has been somewhat restricted in water-dispersed coatings. Recently semi-gloss latex paints have been introduced; but the opinion has been expressed that it will be another three years before satisfactory gloss latex finishes will be produced. The water-based coatings described as satins have usually had a lower gloss than solvent-based satins.

Low gloss finishes generally give a more pleasing appearance on large surfaces, although this may be a matter of personal preference or custom. As is shown in [CBD 76](#), low gloss is achieved by increasing the proportion of pigment to binder. The rougher surface, however, is more easily soiled and is more difficult to clean than a smooth, high-gloss finish. If dirt

penetrates into the pores of a flat, it is frequently only removable by abrading the film; and when adjacent high spots are also worn away, the gloss tends to increase and such "polished" areas are objectionably visible. Consequently, where frequent cleaning is anticipated, low gloss finishes should not be used. High gloss, on the other hand, accentuates imperfections in the substrate so that more careful surface preparation is required. Semi-gloss is often accepted as a compromise between the necessary protection and the desired appearance.

Another visual property of importance is hiding power or covering capacity. This is the ability of a given amount of a liquid coating to conceal a certain area. Because of its higher pigment content, it is easier to obtain high hiding in a flat than in a gloss finish, and is one reason why undercoats are used beneath gloss finishes. As was discussed in [CBD 78](#), latex paints have two disadvantages in achieving hiding power equal to that of corresponding solvent-based coatings. In addition, because of their easy brushing characteristics, they can readily be spread too far. As a result, more coats of latex are often required where a change in colour is desired. The homeowner may be willing to accept this in return for ease of application and absence of solvent, but it is a factor to be considered where labour costs are involved.

Types of Interior Coatings

Water Based. At present the only water paints of importance are the latex paints. They are tremendously popular for various reasons: they are non-flammable during application and allow easy clean-up, since water is the thinner; are easy to brush on; dry rapidly; and have little "paint" odour. Missed areas (holidays) can readily be touched up without showing. Although they are water-based, dried latex films have good water resistance unless highly modified. Because of their high polymer binder, they have better washability than air drying solvent-based coatings of the same degree of gloss.

Latex paints are available as flat, satin (really a velvet) and, just recently, as semi-gloss finishes. Latex primer-sealers are also produced. These are not required for interior latex finishes which are self-priming, but they are used under solvent-based coatings when their quick recoatability is important. They have been used with success on fresh plaster, except where an abnormal amount of water was present. Latex primers are excellent for paper-faced wallboards also, because they do not raise the fibres. Latex paints should not, however, be applied directly over calcimine, glue size, or surfaces that have been treated with zinc sulphate.

With the advent of latex, other types of water paints have decreased markedly in use. Listed in decreasing order of durability and cost, they are resin-emulsion paints, casein paints, and calcimine. All are quite inferior in washability to both latex and solvent-based coatings.

Oil Paints. The only oil paints still used on interior walls are the flat oil paints. They are quite flat and hide well, but these properties are often obtained inexpensively through high pigmentation, which leads to poor washability. The films are relatively porous, so that they do not act as undercoats for finishes with a higher gloss. Deep-coloured flat oil paints generally require preliminary application of a sealer. White and light tints can be used over most wall surfaces. In fact, they were first developed for painting directly over calcimine and wall paper, although this is no longer recommended because it may lead to difficulties at a later date. Flat oil paints have good application properties.

Oleoresinous. These binders are generally no longer used in low-gloss finishes, but find some application in semi-gloss and gloss enamels, undercoats, and interior varnishes. They are often supplied under the so-called painters line of materials. Oleoresinous finishes are fairly easy to apply. They dry rapidly to a hard finish, provided the proportion of oil is not too high. Oleoresinous enamels have better alkali resistance than gloss paints or alkyd enamels, but they have poorer colour retention than the latter.

Alkyd. Alkyds are the most widely used resin in coatings. They are, therefore, available in all the different interior types: flat, velvet, semi-gloss, gloss, undercoat, and clear varnish. Finish coats of all degrees of gloss should have good hiding power. Low-gloss alkyd enamels can be formulated to withstand washing almost as well as latex paints and to be self-sealing. Hence,

they can be used over almost all surfaces except fresh plaster. Most gloss and semi-gloss enamels require primer-sealers or undercoats before application to plaster or wood. There are a few medium-gloss finishes on the market that act as their own sealer, but because they cost more than normal sealers it is often more economical to use the two separate materials.

The colour retention of alkyds is very good. They should not be used where they will be exposed to fairly strong alkali, and they are generally not so easy to apply as latex finishes. With regard to "paint smell," alkyd finishes can be prepared with ordinary mineral spirits, low-odour thinners or odourless thinners. Even with the latter, however, there will probably be some odour from the oxidation of the binder. This will be most noticeable in confined quarters.

Epoxies. Epoxy-esters have little to recommend them over other air-drying coatings, but cold-cured epoxies are quite different. They can be formulated into finishes having excellent chemical resistance for use in industrial plants. They can also produce coatings with high impact and wear resistance. In general, epoxies have excellent adhesive properties.

In most epoxy finishes the resin is dissolved in solvent so that the resultant film thickness is about the same as that obtained from other coatings. Where it is desired to obtain a thick film from only one or two coats, high-build epoxies can be used. Neither type, however, can be said to possess good application properties. The high-build epoxies, in particular, require trained applicators or serious difficulties may be encountered.

Urethanes. This class of resin is available in five types, as is outlined in [CBD 79](#). In urethanes, the oil-modified variety retains to a considerable degree the beneficial properties of the reactive types. Their chief attributes are rapid dry and film toughness. As with the two component epoxies, reactive urethanes with outstanding wear and impact resistance are available. They are somewhat easier to apply than the epoxies. Generally, they contain lacquer-type solvents that may lift previous coatings and have a strong odour. The chief difficulty with urethanes has been in recoating. Even fresh coats require light sanding if more than 24 hours' drying time is allowed between coats, and old finishes need to be sanded thoroughly for subsequent coats to adhere. Except with the oil-modified and baking urethanes, reactivity with water vapour in the air leads to loss of stability once the container has been opened.

Preparatory Coats. There are two different classes of finishes that are used under interior topcoats: primer-sealers and undercoats. They are sometimes known by other names or combinations of names such as surfacer, primer-surfacer, etc. Primer-sealers are used on unpainted walls and wallboard and on porous painted walls before the application of gloss and semi-gloss enamels or deep-tone flat oil paints. If the material is not pigmented it is usually referred to simply as a sealer. The chief disadvantage of solvent type primer-sealers is that they raise the nap on paper-coated wallboards, thus requiring sanding followed by a second coat.

Undercoats or surfacers are used on woodwork and on walls when minor surface irregularities have to be hidden. They are highly pigmented so that they will provide a smooth regular surface that can be easily sanded, if desired. Some manufacturers recommend a first coat of sealer or primer-sealer on new woodwork, but the current trend is to use only the undercoat. Both sealers and undercoats are made from oleoresinous and alkyd vehicles, with the latter usually regarded as the premium grade.

Epoxy, urethane and other specialized coatings are either self-priming or require a specific undercoat. The term "tie-coat" has come to mean a particular intermediate coat that allows use of a normal top-coat over a special primer or a unique topcoat over a normal type primer.

Recommended Uses

If one kind of interior finish were superior in all properties, each manufacturer would have just one product. As there are so many, it is evident that the type of material to be used depends chiefly upon the circumstances of use. Each protective coating is a compromise, and it should be realized that coatings chemists do not always agree on the best solution to every problem.

The recommendations given in this Digest, therefore, are those that the author believes will be most generally applicable.

Dwellings. Flat finishes are generally used in living rooms and bedrooms. For new work or in repainting where there is only a minor change in colour, latex paint is preferred. Latex is also suggested for children's bedrooms because of good washability. If there is a marked colour change or the surface has been coated with a water sensitive material, a low-gloss alkyd enamel of the self-sealing variety is recommended. It has been reported that in a few cases, for reasons unknown, successive coats of either latex or alkyd failed to provide a uniform finish. The defect has been overcome by applying one coat of the opposite type.

In halls a velvet or, preferably, a semi-gloss finish is appropriate. In large apartments, use of wear resistant epoxy or urethane coatings should be considered at least for the dado.

Kitchens and bathrooms are usually finished in semi-gloss or gloss because of the greater need for washability. Some people, however, prefer to repaint with an easily applied coating rather than wash kitchen walls frequently. The amount of cooking, type of stove and venting, if any, all have some bearing on the final choice. For a gloss or semi-gloss finish an alkyd is preferred unless extremely good washability is required in areas of heavy use. In the latter case, an oleoresinous enamel or, for extreme alkali resistance, a chlorinated rubber or urethane enamel can be used.

Wood trim is usually finished with gloss or semi-gloss enamel, although this may be more a custom than a necessity. For a clear finish on wood panelling, alkyds and moisture-cure urethanes have the palest colour. It should be noted that it is almost impossible to put a clear finish on wood and still retain its original appearance. Any finish that wets the surface, including water, makes wood look darker in colour than it does when in contact with air. Shellac is not usually recommended, even as an initial coat on wood, because of poor water resistance and poor adhesion of subsequent coatings.

Urethanes can be highly recommended on floors because they offer the best combination of hardness and flexibility required for this service.

Institutional and Commercial Buildings. Some areas of large buildings such as the ceilings do not receive any more wear than similar locations in dwellings. The same types of coatings can therefore be used satisfactorily. The halls and corridors of hospitals, schools, large apartments and office buildings, on the other hand, are subjected to intensive use. Only the more resistant coatings are practical in these situations. Not only is the cost of labour increased by frequent repainting but unnecessary interference with normal use of the building should be avoided; and heavy-duty materials that can easily be applied before occupancy may not be suitable for recoat work because of odours or application techniques that are objectionable.

Walls of individual or small offices may be coated with an eggshell finish. Larger offices, depending upon the type of use, may require at least a satin. For recoat work latex paints are preferred because of fast dry and inoffensive odour. Any flat finish is suitable on ceilings. The question of painting acoustical tile is frequently raised. Conventional flat finishes, regardless of type, should not affect their function to any extent.

Wear-resistant epoxies and urethanes are recommended for corridor walls. In hospitals and schools where there will probably be considerable impact and abrasion use of high-build coatings is advisable. These materials are particularly suitable for application to concrete block walls because they give a smooth tile-like coating that can be repaired if damaged. A block filler should first be applied to fill large pores and seams. High-build epoxies, both with and without laminate reinforcing, have been used on walls of showers.

Most floors of large buildings do not require painting because of the use of floor coverings or terrazzo. In high-rise buildings, where the weight of the latter limits its use on upper floors, seamless terrazzo based on epoxy or urethane binders and plastic chips have been employed. Basement floors are usually concrete and should be treated to stop dusting. Magnesium fluosilicate can be recommended as an unpigmented treatment that can subsequently be

painted. Water glass (sodium silicate solution) may lead to difficulties, if applied to concrete before painting. Provided there is no hydrostatic pressure, two-component or moisture-cure urethanes should give good service in areas of heavy traffic.

Conclusion

This Digest has considered the different finishes applicable to the interiors of buildings. An attempt has been made to relate the properties of the materials to their field of use.

Little mention has been made of the care necessary for preparing the surface or in applying the coating. It is well recognized in the paint industry that an inferior material applied to a properly prepared surface will outperform a superior material applied to a poor surface. In addition, if a surface is prepared well but the coating is not applied properly, an unsatisfactory job will probably result. These statements are especially true of the newer, high performance coatings. After selecting the best material for a given job, it is necessary that instructions are followed thoroughly.