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R. R. Bruhn

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# SWP BASIC FORMULATION
# EXTERIOR FLAT HOUSE PAINT

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Abstract:

A new exterior flat house paint line has been formulated for use on shakes, shingles, and rough lumber. Combined with a suitable primer it may be used on stucco and masonry. The formula is a low PVC (28-32%) type flat which utilizes pigment and vehicle components whose record for exterior durability is good.

The exterior house paint market is undergoing a change necessitated by the adoption of new or textured exterior wall surfacing materials. We have all been conscious of the proportionately greater number of masonry, shake, shingle, rough lumber or stucco houses being built in our own communities. What we may not have realized is that this shift to materials other than smooth wood siding represents a trend over the entire country.

The Sherwin-Williams 1954 house paint color survey tabulated more than seven thousand houses. Almost one third were either shake, shingle, or rough siding, another third were some form of masonry, brick or stucco, and only one third of the newer homes were conventional smooth siding type of exterior. This survey covered homes built during the past ten years and should indicate our future exterior paint market.

Today a gloss line of exterior house paints is not enough. It is important that we offer flat finishes for both the shake and the stucco market. It would be nice if one product could serve both. At the moment this objective is being kept in mind but the first effort has been to prepare a flat paint suitable for shakes, rough siding or wherever a flat exterior finish is desired on wood.

We have had a line of shake paints on the west coast for some time. Lowe Brothers and Martin-Senour each have experience with their own shake paint lines. We have reviewed their formulations and the exposure tests which have been made. With this background information and their help we have tried to prepare a paint possessing the good features of each.

A review of the formulations being used reveals that the pigment volume concentrations are quite different. The west coast and the Lowe Brothers formulas were similar. Pigmentwise both consisted of color or opaque pigment, magnesium silicate extender, calcium carbonate extender, mica and zinc oxide. Colors were not standardized between the coast and Lowe Brothers but it was found that for most purposes these pigmentations were almost identical also. Vehicle-wise, Lowe Brothers uses a long oil alkyd plus a leaded oil while the west coast Sherwin-Williams formula is a blend of raw and heat bodied oils. Lowe Brothers and Sherwin-Williams west coast formulas were at 47-53% PVC. Solids on these paints total 50 to 55 gallons per 100 gallons of paint.

The Martin-Senour line of shake paints is formulated at PVC's approximating 35%. Their pigmentations consist of non-reactive prime pigments with mica and Celite as the only extenders used. The vehicle is a blend of raw and bodied linseed oils plus a portion of a tall oil maleic varnish. Solids on the Martin-Senour shake paints total 38 to 42 gallons per 100 gallons of paint.

Reviewing the comparative properties of these paints it has been demonstrated that the Lowe Brothers and the west coast shake paints have good uniformity when applied to large surfaces. The Martin-Senour material tends to polish on the laps and has a tendency to appear somewhat striated and granular when applied to smooth surfaces. This coarseness is not noticeable on shakes. It was our impression that the Martin-Senour material was somewhat easier to apply than either of the other paints compared. All of these paints did a reasonable job of holding on the ridges or sharp corners of shakes.

Weathering experience with these paints is not complete. Some exposures have run 15 months while others have been exposed as little as 5 months. California exposures at 15 months demonstrate clearly that low pigment content is to be preferred for tint retention characteristics. Martin-Senour exposures corroborate this point. We do not know whether this comparison is justifiable but it was found that exposures of Martin-Senour Colorsol at 11 months showed outstanding color retention. These were asbestos shingle exposures. Although Colorsol carries a different vehicle its pigmentation substantially duplicates that of their shake paint line. We attribute the excellent performance to the low PVC and the non-reactive type of pigments which are used.

With these facts at hand regarding exposure experience, application characteristics and general paint experience, we have set out to put together a line of paints which we hope will inherit the good characteristics of each. There is little to be gained by reviewing the historical development of the formula except to say that the first attempt was to follow the Lowe Brothers vehicle system at a PVC in the 30 - 35% range. After extended trials we settled upon a vehicle system containing (3870) a long oil linseed-soya alkyd varnish, (2539) bodied linseed oil, and (25 A 23) a vacuum bodied linseed oil. The pigmentation consists of prime pigment of the non-reactive type, 6028 dry Celite 266, 62 C 2 dry mica, 6210 dry Bentone 34, and a small amount of litharge to stabilize drying properties. It was found that by using Celite 266 for the bulk of the extender the PVC could be held in the 28 - 32% range retaining flatness, good application characteristics, and good uniformity when lapped. These paints are formulated to contain approximately fifty five gallons of solids per 100 gallons.

In this discussion we would like to cover the thinking in support of the type of formula which has been adopted for these paints. The vehicle components have proved exterior durability. (3870), formerly (4106), has been used in SWP trim paints and Kem Bulletin colors for many years. Bodied linseed oils have been used extensively in house paints since 1943 and their use has been described frequently as one of the outstanding moves in exterior paint formulation practice over many years.

The pigmentation was described above as consisting of prime pigment of the non-reactive type plus the appropriate extenders - Celite and mica. The stipulation of non-reactive prime pigment includes the following: titanium dioxide as the white; iron oxide reds, browns, and yellow; phthalocyanine blue and green; carbon black; and chromium oxide green. These have been selected because formulation from one color to another is possible without introducing the variable of pigment vehicle reactivity. The value of this qualification of non-reactivity is demonstrated by the consistent viscosity of paints over the range of colors proposed for this line. The data in Table I illustrate this point.

Table I

| Paint No. | Color | Viscosity | | |
|---|---|---|---|---|
| | | Fresh | 24 hr. | 14 Days |
| RB 5183 | White | 79 KU | 81 KU | 79 KU |
| RB 5186 | Tint Base (deep colors) | 81 | 83 | 83 |
| RB 5187 | Tint Base (light colors) | 80 | 83 | 82 |
| RB 5188 | Rialto Red | 82 | 82 | 83 |
| RB 5193 | Rialto Red | 76 | No Data | 83 |
| RB 5189 | Java Brown | 81 | 81 | 81 |
| RB 5190 | Diana Green | 78 | No Data | 78 |
| RB 5191 | Everglade Green | 74 | No Data | 78 |

A second and even more important reason for specifying non-reactive prime pigments is to obtain color permanence. At some future time it is possible that this material might be recommended for masonry surfaces over a suitable primer. If this is done we have the additional requirement that the pigments must also be alkali resistant. It was our thought that if such a recommendation is in the offing we should be prepared for it and not have to face a reformulating job at that time.

The adoption of a non-reactive pigmentation makes it imperative that the fungicide employed be effective. Cuprous oxide is used for the deep colors and may be employed for the entire line. At the time this report is being written this is undecided since trouble is being encountered with a copper discoloration of the vehicle. If this vehicle coloration can be avoided it has been shown that the direct color contribution of the cuprous oxide itself can be tolerated even in the white.

Mention was made earlier in this report of the application and appearance requirements for a material of this type. The fact that it is intended for usage on shake or stucco houses where texture is pronounced requires unusual limitations on flow. Uniformity of laps is also very important since usage is visualized on bevel siding and smooth walls as well. These divergent requirements have made some unusual testing necessary. At the outset it was found that paints of this type might tend to flow from the ridges of a striated cedar shake shingle. When the shake is primed thoroughly the problem of flow is even greater.

The test for flow is to paint cedar shakes which have been primed with Rx 450 SWP Undercoater. The shake is placed flat on the table so that a generous coat may be applied with a 4" brush, brushing in the direction of the grooves. Just as soon as the paint is spread the panel is stood on end. Panels should then be inspected at intervals. No sagging or running of the paint should occur. The ridges of the shakes should also be coated uniformly and fully.

The control of flow is obtained by the use of Bentone 34. Reports of the Paint Research Department have covered the recommended procedures for handling this material in the past. We would like to re-emphasize their importance.

For roller mill, Hy-R-Speed, or Premier mill usage Bentone Base BI-72 is required if good results are to be obtained. For ball or pebble mill operation the base may be made in the mill after the pigments have been dispersed and dropped from the mill and just before the wash operation. Grinding destroys the efficiency of Bentone 34. Therefore, the procedure must be used which will incorporate it uniformly with the least work being done.

Initially our test for laps was to paint out large 4' x 8' areas and then inspect these for uniformity after the paint had dried. By this test we found that most paints of this type showed a polish or "shiner" at the lap. This was not on the double coated portion of the surface but just adjacent to it where the brush had fanned lightly over the area painted at the earlier period. This polish was found to be associated with the disturbance of the film after it had partially set, rather than the double coated area.

A laboratory test for this polishing characteristic as compared with the effects of double coating is to apply paint by drawdown on glass. In one instance areas of the film are lightly brushed over with a dry brush at 5, 10, and 15 minutes. After drying is complete these areas are compared with the undisturbed film for gloss and sheen. The test for the double coating is to apply one drawdown over another after 15 minutes dry on the first coat. This may be done by supporting the drawdown gage for the second coat on strips of tape laid down alongside the first drawdown. A satisfactory paint will show little or no glossing or polishing on this double coated area compared with the single coat.

In summary, it may be said that a paint has been formulated which should have good exterior durability. It products a flat uniform finish without polishing even when lapped after 20 - 25 minutes on a normal day.

Extensive testing will be required before the performance of the material may be established in service but there is every reason to believe that it will do well. A broad exposure program is under way, including both panel tests at a variety of locations and house tests.

The suitability of these exterior flat paints as masonry finishes will depend to a great degree on the primer employed. Tests are in progress to select the most satisfactory primer formulation.

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