

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
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Letter
Circular
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METHODS OF INVESTIGATION OF CEMENT-WATER PAINTS

I. General

Brush coatings of mixtures of portland cement, water and other ingredients have been used for many years as finishes for masonry walls. Their function may be to decorate the masonry, to protect it against agents of weathering, or to reduce water penetration.

The cement-water paints in common use have widely differing compositions. All contain portland cement. Most of the commercial paints also contain hydrated lime. Frequently hygroscopic salts, coloring pigments, fillers, accelerators, water-repellent substances and white opaque pigments are added. No systematic investigation of the effects of these additions on the qualities of finishes has been made. The effects of such factors as the nature and condition of the masonry surface and the method of applying the paint have not been studied. However, the results of a few tests conducted by the Portland Cement Association and by the National Bureau of Standards indicate that the amount of rain which penetrates cement-water paint coatings on masonry walls depends largely upon the method

of application. Specifically, coatings applied by means of stiff brushes have been found to be more resistant to leakage than those applied with hair brushes or spraying equipment.

II. Purpose of Investigation

The investigation is undertaken to determine the effect of composition of the paint and surface texture of the masonry on the quality of the finish. The durability will be judged by the performance of small panels of dense concrete and others of cinder concrete coated with cement-water paint during exposures to accelerated weathering and to natural weathering. In addition, a few walls of concrete masonry blocks and of brick will be exposed outdoors. The value of cement-water paint as waterproofing will be judged by the results of permeability tests on walls approximately 40 in. long and 50 in. high. Other properties of the paints to be studied include ease of mixing, rate of settling, brushing properties, recoatability, hiding power (wet and dry) and hydraulic cementitious value. If the correlation between these properties and the qualities essential for satisfactory service is sufficiently close, it may be possible to devise simple tests and specifications which will serve to indicate quickly the quality of the paint.

III. Composition of Materials

The paints to be investigated by accelerated weathering tests and by outdoor exposures, after application to small panels, will include not only several brands of commercial cement paints but also mixtures of portland cement and lime in proportions varying from 100 percent portland cement to 100 percent hydrated lime. Two brands of white portland cement will be used. The limes will include both a high-calcium and a dolomitic lime. In addition, a single mixture of portland cement and hydrated lime, using but one of the cements and one of the limes, will serve as a base for compounding other paints with varying amounts of calcium chloride, sodium chloride, boric acid, titanium dioxide, lithopone, tinting colors, diatomaceous silica and/or a water repellent.

IV. Methods of Evaluation

1. Accelerated weathering. There are at present no standard methods for making accelerated weathering exposures for cement-water paints. An attempt will be made to devise a method which will produce quickly the defects caused by long exposures to the weather. The specimens will consist of stone and cinder concrete panels, 3 by 6 by 1/2 in. Two panels will be prepared for each kind of paint - one for a single brush coat and the other for two coats.

2. Outdoor weathering. The specimens will consist chiefly of 10 by 10 by 1 in. concrete panels painted on both sides. In addition, walls of concrete block and of brick will be exposed after painting. All specimens will be examined at suitable intervals for the following defects: flaking, crazing, staining, fading of color and loss of opacity.

3. Permeability tests of masonry walls. Masonry wall panels of brick, sand and gravel concrete, and cinder concrete will be constructed and tested for permeability by the methods described in Letter Circular 502D. The panels will be approximately 50 in. high and 40 in. wide. After aging and testing for permeability, the exposed face will be painted with cement-water paint and then retested for water permeability. The amount of paint applied for each coat will be determined. The panels will then be exposed outdoors and examined at suitable intervals for defects in the paint film. Within one year they will be retested for permeability to determine the effect of exposure upon the permeability of the paint film.