TECHNICAL INFORMATION ON BUILDING MATERIALS

TIBM-9

FOR USE IN THE DESIGN OF LOW-COST HOUSING

*****

THE NATIONAL BUREAU OF STANDARDS
UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON, D. C.

May 13, 1936.

CONCRETE FLOOR TREATMENTS

This is a digest of information found in Letter Circular 139, "Report of Service Tests on Concrete Floor Treatments", (October 28, 1920),[1] issued by the Bureau of Standards.

A comparative study of 17 proprietary and 5 "home" treatments was made, based upon observations of treatments applied to corridor panels 8 feet square which were all subjected to much the same foot traffic conditions. The first treatments were applied about 5 months after the corridor floors were completed, at which time they had begun dusting. Other treatments followed during the next 6 months.

While the results were not quantitative or necessarily conclusive, they were generally indicative of what might be expected with regard to service and behavior.

The summary following shows that treatments A to F inclusive gave generally good results but that further study was needed to determine the proper strength of the magnesium fluosilicate solution and methods of application. Treatment G gave excellent results. "Home" treatments I and J proved very successful, were easily applied and inexpensive. Instructions for their preparation and use are given on page 6.

[1] Obtainable without charge from the National Bureau of Standards, Washington, D. C.

CONDITION AND APPEARANCE OF TREATED CONCRETE FLOOR PANELS

AT END OF SERVICE PERIODS

Treatment	Composition and Method of Application	Service Period	Condition and Appearance	Remarks
A	15% solution magnesium fluosilicate, applied 3 coats diluted as follows: 1st coat-1 part solution; 2 parts water; 2nd " -1 " " ;1 " " ; 3rd " -2 " " ;1 " "	2 yr. & 3 mo.	Surface quite hard. A few small, soft, and readily scratched areas show signs of wear.	Appears these areas originally received improper amount of treatment.
B	8.7% solution magnesium fluosilicate, applied 3 coats diluted same as Treatment A, regardless of weaker solution.	1 yr. & 9 mo.	Considerable wear. Scratched in many places.	Probable that solution was too weak.
C	14.5% solution magnesium fluosilicate, applied copiously in 1 coat without dilution.	2 yr. & 2 mo.	Good condition. Uniform in appearance No signs of wear.	
D	11.5% solution magnesium fluosilicate, applied 3 coats diluted same as Treatment A.	1 yr. & 8 mo.	No definite signs of wear. Uniform appearance.	
E	18% solution magnesium fluosilicate and small amount zinc fluosilicate, applied 3 coats diluted same as Treatment A.	2 yr.	No appreciable wear.	Applied to a very poor panel, i.e., crumbling badly at the surface.
F	7.3% solution magnesium fluosilicate, containing 2.6% magnesium sulphate and 4.5% free hydro-fluosilicic acid, applied 3 coats diluted same as Treatment A.	1 yr. & 11 mo.	Considerable wear. Easily scratched.	

CONDITION AND APPEARANCE OF TREATED CONCRETE FLOOR PANELS

AT END OF SERVICE PERIODS (Cont.-2)

Treatment	Composition and Method of Application	Service Period	Condition and Appearance	Remarks
G	16% solution zinc sulphate with about 4.5% free sulphuric acid, applied 2 coats without dilution.	2 yr. & 3 mo.	Very hard and uniform surface. Darker than original concrete.	1st coat dried 4 hrs. Surface then scrubbed with hot water and mopped dry before 2nd coat applied.
H	20% solution sodium silicate with small addition of an organic acid, applied 2 coats without dilution, 24 hours apart.	2 yr. & 2 mo.	No signs of wear. Surface hard and uniform.	Slab covered wi plank until dry brighter and more uniform appearance than original.
I*	8% solution commercial sodium silicate, applied 3 coats.	2 yr. & 2 mo.	No signs of wear. Very hard surface. Uniform appearance, lighter than original.	Each coat was preceded by thorough scrubbing with water
J*	15% solution aluminum sulphate, applied 3 coats diluted as follows: 1st coat-1 part solution; 2 parts water; 2nd " -1 " " ;1 " " ; 3rd " -2 " " ;1 " "	1 yr. & 6 mo.	Not so hard as other panels but quite satisfactory.	Applied liberally with white wash brush; intervals of 24 hrs. Very economical home treatment.
K	Gray paint with pigment of basic lead sulphate, siliceous matter and carbon in tung oil resin varnish (mineral spirits thinner), applied 2 coats, 24 hours apart.	2 yr. & 2 mo.	Shows effect of wear. Lacks uniform appearance.	Surface thoroughly swept. Plank over panel until dry.
L	China wood oil varnish, applied 2 coats, 24 hours apart.	2 yr. & 1 mo.	Slight surface wear. Few scratches. Lighter color where worn.	Ditto.

*Indicates home treatments.

CONDITION AND APPEARANCE OF TREATED CONCRETE FLOOR PANELS

AT END OF SERVICE PERIODS (Cont.-3)

Treatment	Composition and Method of Application	Service Period	Condition and Appearance	Remarks
M	Same as Treatment L.	2 yr. & 2 mo.	No appreciable signs of wear.	Surface thoroughly swept. Plank over panel until dry.
N	Thin bodied mineral spirits varnish, applied 2 coats, 24 hours apart.	2 yr. & 1 mo.	Signs of wear denoted by light appearance.	Ditto. Panel originally weak and crumbling badly, hence test quite severe.
O	Gray paint with pigment of basic lead sulphate, zinc oxide, barium sulphate, siliceous matter, and carbon in linseed oil, resin (and probably some tung oil) vehicle; mineral spirits thinner. Panel swept clean--1st coat thinned with material called "reducer" (a thin bodied varnish); 2nd coat--24 hours later without thinner.	1 yr. & 5 mo.	No signs of wear except few scratches on wax-like surface.	Not especially resistant to scratching but reasonably durable under foot traffic.
P	Very thick paint consisting of pigment of zinc oxide, lithophone and bone black in varnish vehicle containing resin, applied in 1 coat, sufficient for purpose.	1 yr. & 6 mo.	Thick film marred by small spots blistered and worn off.	Pleasing to walk on but has not proven durable. Directions called for two coats.
Q	Solution of heavy hydro-carbon wax in light hydro-carbon oil, applied 2 coats, 24 hours apart.	2 yr. & 3 mo.	Considerable wear.	This treatment only to hold dust down. No claims made as to hardening surface.
R	Mixture of waxes applied in molten condition. Surface heated before and after application.	2 yr. & 4 mo.	Shows considerable wear; worn through under chairs.	Treatment applied to 1 panel and 1 office room.

CONDITION AND APPEARANCE OF TREATED CONCRETE FLOOR PANELS

AT END OF SERVICE PERIODS (Cont.-4)

Treatment	Composition and Method of Application	Service Period	Condition and Appearance	Remarks
S	Consisted mainly of linseed oil with small addition of citronella, applied in 1 coat, kept covered until dry.	2 yr. & 2 mo.	Not entirely satisfactory. Not uniform.	Panel probably should have had 2 coats. Directions advised 1 coat fo new and 2 coats for old worn floors, hence little weight should be given test.
T*	Treatment consisted of 4 applications raw linseed oil thinned with turpentine.	2 yr. & 2 mo.	Quite hard. Resists wear very well.	Results at firs not very satisfactory, but appeared to harden with age.
U*	Frequent scrubbings with thick soap solutions.**	1 yr. & 6 mo.		
V*	Emulsion of fuel oil and soap, 3 qts. oil, 2 bars Ivory soap, and 4 gals. of water, 10 applications were given.	Approximately 2 yr.	Greatly improved surface; harder than original.	This treatment not included in above series but was applied more recently. Emulsion applied wit mop at intervals of week or two. Applications leave floor slip pery for few h hours.

*Indicates home treatments.

**Treatment U: Concrete floors under actual use sometimes take on a polished or wax-like appearance. To determine if precipitation of soap in the concrete caused this, sections of floor were frequently scrubbed with a thick soap solution. The polished condition did not occur in this case, probably due to floor being very porous, hence, the solid matter from treatment was not retained in the concrete.

Instructions for making two of the home treatments:

(I) Sodium Silicate Treatment: Dilute each gallon of commercial sodium silicate with four gallons of water, which should cover approximately 1000 square feet, one coat, depending on porosity of floor to be treated. The solution should not be mixed until ready for immediate use and then applied with mop or hair broom, continuously brushing surface for several minutes to obtain an even penetration.

Before applying treatment, all grease spots, plaster, etc., should be thoroughly removed from the surface to be treated, scrubbed with clear water and then dried several days.

Twenty-four hours should be allowed between applications, scrubbing with clear water between each treatment. Three applications should, in most cases, prove sufficient, but if saturation point does not seem to have been completely reached, a fourth coat should be applied.

(J) Aluminum Sulphate Treatment: Solution should be made in wooden barrel or stoneware vessel. Estimate one gallon of solution for each 100 square feet of area. To make solution, dissolve 2 1/2 pounds of powdered aluminum sulphate per gallon of water, acidulating the water by adding 2 cc. (about 40 drops) of commercial sulphuric acid. The solution should be stirred occasionally for a few days until completely dissolved.

Thoroughly dry clean and scrub floor as directed in Treatment I. After the surface has dried and at 24 hour intervals, apply 3 treatments, mixing for the 1st coat, 1 part solution to 2 parts water; 2nd coat, 1 part solution to 1 part water; 3rd coat, 2 parts solution to 1 part water. Apply with mop or hair broom, brushing for several minutes to secure uniform penetration. After 3rd coat has dried, scrub with hot water.