RESEARCH

Sept. 16, 1957



Mr. A. L. Jones
JOPLIN PLANT

Re: Partial Replacement of White Portland Cement with Molding Plaster in One-Cote Formulation - Characteristics of Plant Made Batches.

COPY

As a continuation of our study of the partial replacement of white portland cement with an equivalent weight of molding plaster, several plant batches were made following the formulation suggested in our note of August 30. In each case 18 lbs. of molding plaster were used in the formulation and 18 lbs. of white portland cement removed from the formulation. At the time these experimental batches were made, a single bag of One-Cote Cement, made just prior to the batch which contained the gypsum, was also removed for evaluation. In most cases, Tom Carico and Melvin Sherwood performed independent tests on the samples with regard to wet coverage. In addition, Sherwood made tests for shrinkage upon drying, abrasion resistance, hardness when saturated with water, compressive hardness and setting up time. Tabulated below are those results that can be reported as numerical values:

Lot No.		Wet Coverage bd.ft/100 lbs.	Shrinkage upon Drying - %	Abrasion Loss 10-min.	Abrasion Loss 20-min.	Tested by
9629	No Gypsum	35.7	None	13.3%	23.3%	Sherwood
	With Gypsum	35.6	None	16.6	29.9	"
9631	No Gypsum	36.5	None	13.3	24.1	Sherwood
	With Gypsum	36.1	None	12.8	23.1	"
9631	No Gypsum	35.2				Carico
	With Gypsum	35.5				"
9632	No Gypsum	39.2	None	20.75	39.6	Sherwood
	With Gypsum	41.2	None	20.2	36.3	"
9632	No Gypsum	35.2				Carico
	With Gypsum	35.2				"
9634	No Gypsum	42.1	None	42.4		Sherwood
	With Gypsum	39.9	None	30.9	55.4	"
9634	No Gypsum	34.8				Carico
	With Gypsum	35.5				"

The additional tests made by Sherwood showed that at all times the One-Cote Cement formulated with the gypsum had the ability to remain hard, even though the cement was saturated with water. Also his tests for compressive hardness showed that One-Cote Cement without gypsum sustained a load of 187.5 psi with a 5%

083377

USNR 000227

reduction in thickness, while the One-Cote Cement formulated with gypsum was able to sustain a load of 189.25 psi for the same reduction in thickness.

An attempt was made to determine if the addition of gypsum changed the setting time of the modified One-Cote Cement formulation. Samples of both formulations were mixed and allowed to set for periods of time up to two hours. As would be expected, both formulations showed a gradual stiffening with time, but both of them were still towelable after standing for a period of two hours. The dried cements in both instances showed similar fall-off in their abrasion resistance and compressive hardness. As all these changes were of the same order we believe that the addition of the gypsum has not resulted in any changes which would be detected during field application.

COPY

In our report of the characteristics of the laboratory formulated cements with gypsum, we indicated that the substituted formulations showed dry adhesion properties. The plant batches were evaluated for this characteristic, but no consistent adherance to metal can be reported from batch to batch or even within a batch. At times Carico would report that the sample he tested stuck to a steel surface. Sherwood found the same characteristic of adherance, but these results were not consistent and we hesitate to claim that One-Cote Cement, with gypsum, has the property of dry adhesion.

As a final point of evaluation, Carico examined the formulations containing gypsum for the possibility of rust formation when the samples were applied to steel. Following our standard procedure used in testing this characteristic in Super "66" Cement, he found that the addition of gypsum did not result in a cement that caused the formation of rust on the steel surface to which it had been applied. Regular One-Cote Cement has never showed any indications of promoting the rusting of a steel surface.

Our evaluation of the plant batches confirms in every respect the results we obtained through our laboratory evaluation. It is our opinion that gypsum can be safely substituted to the amount of 18 lbs. for an equivalent weight of white portland cement in our One-Cote formulation. We believe that this substitution should be used until all the molding plaster now in inventory is consumed. In the meantime we will study the benefits which might be derived if gypsum were to be added to our One-Cote formulation as a standard ingredient. As of this writing we have yet to hear from the U. S. Gypsum Company regarding the samples of various gypsums which we requested for our testing program. A letter has also been sent to Certain-Teed Products Company in order to obtain samples of the various gypsums which they manufacture. As results from our additional laboratory work become available we will keep you advised.

P.L.L

Paul L. Losse

PLL/s
cc: Mr. Glen J. Christner
Mr. Larue Cook

083378