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MONO-KOTE REFORMULATION

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Test Report No. 1275

Laboratory Data Book No. 81, pp. 66, 67, 68, 70, 71, 72, 74, 79, 82, 83, 84, 90, 91, 92, 108, 112, 144, 145, 146, 147,148

Laboratory Data Book No. 85, page 10

Laboratory Data Book No. 89, page 6

Pilot Fire Test Reports - 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28.

References: Zonolite Test Reports No. 1014, 1016, 1109, 1203 & 1231

Work done by: R. J. Bragg, W. R. Payment, F. L. Decker

Work requested by: R. W. Sterrett

Purpose of Test: To reformulate our product, Mono-Kote, to reduce costs and improve performance.

Abstract: A long range study of Mono-Kote and similar types of materials has narrowed the search for an improved fireproofing material. Work on this project has included shifting of gypsum to vermiculite ratios, additions of ore concentrate and starch, reduction of fiber content and a study of various aggregates including D-16 material.

A previous report (Zonolite Test Report No. 1203) had only covered the first 3 of 10 compositions and had not included No. 4 or D-16 aggregates which are herein reported. The reason for omitting these promising aggregates was that Report No. 1203 concerned primarily a density study, using Mono-Kote MK-3 as control and only varying the amount of aggregate, not type.

Within this report are discussions on nine basic relationships, leading to a final formulation, No. 89-6 which has the following properties; 20% more aggregate , 50% less asbestos, able to effectively utilize Model A or D-16 expanded No. 4, this latter aggreg te providing up to 18% higher yields.

Reduction of Asbestos Fiber

Total elimination of fiber has been previously reported in Zonolite Test Report No. 1231 as follows:

"Abstract: The exclusion of asbestos fiber from our Mono-Kote MK-3 formulation results in a product, which when compared with Mono-Kote, has the following properties:

a) 20.8% higher dry bulk density.

b) 5.2% higher cured density.

c) 10.0% shorter set time.

d) 17.8% lower water requirement.

e) 10.3% lower raw materials cost for producer.

f) 5.2% higher raw materials cost for consumer.

To express it a bit differently, we could save $.09 per bag in manufacturing costs by eliminating asbestos. The customer would lose $.10 per bag in reduced yield (i.e. @ $2.00 per bag selling price).

It was noted that this product provided a 6.3% shorter fire endurance time than regular Mono-Kote, but re-tests may show this to be within the range of experimental error.

It is sensed that some means should be taken to lower the density of such a mix as herein discussed; perhaps by use of the new D-16 No. 4 aggregate, more aggregate and/or more efficient air-entrainment mechanisms."

Subsequent work and analysis indicates some fiber should be present to improve yield and plasticity of the mix. It was found also that reduction of fiber by 50% requires more aggregate to equal the expected yields, hense the increase in mix ratio to 1:10, i.e. 100 lbs. of gypsum:10 cu. ft. of aggregate.

Starch Additive

The addition of 0.8% by weight of starch slightly increased set time and yield, but the amount of change is considered within experimental error. It is therefore assumed that presence of starch in this type of material neither helps nor hurts product performance.

Cost Analyses

It is found that the equal or higher yields obtained with No. 4 aggregates will produce Mono-Kote with lower in-place costs than we now enjoy. Manufacturing costs are lower also with reduction of asbestos fiber. Table 7 shows relative costs of MK-3 versus Mix 89-6 which is the best of our efforts to date.

Respectfully submitted,

Ralph J Bragg

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Approved:

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RJB:ej
enclosures: Tables 1, 2, 3, 4, 5, 6, & 7