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Kaylo Improvement Program

by

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OWENS-CORNING
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Kaylo Improvement Program

by

TECHNICAL CENTER
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SUMMARY AND CONCLUSIONS

Experimental data collected during the past year indicates OCF can produce and market a calcium silicate product having strengths equal or superior to Thermobestos. To accomplish this, phenolic coated glass fibers, vinyl chloride coated glass fibers, or specially processed amosite asbestos fibers will have to be used as reinforcement along with a modified version of the present process.

Regardless of the type of reinforcing fiber used, the present process will have to be modified if strength improvements obtained in the laboratory are to be duplicated in the factory. The amount of change will depend on the type of reinforcing fiber used. Vinyl chloride coated glass fibers will require the least change, the specially processed amosite asbestos fibers the most change.

Phenolic coated glass fibers and specially processed amosite asbestos fibers should have no effect on stress corrosion whereas vinyl chloride coated glass fibers cause severe stress corrosion cracking of stainless steel. Marketing has decided that no fiber (or any other ingredient) which will intensify the problem of stress corrosion can be added to Kaylo. Phenolic coated glass fibers meet the stress corrosion requirement and at the same time provide adequate reinforcement. Costs of formulations containing 4% by weight phenolic coated glass fibers will not exceed the cost of "10L-2" batch (standard production, second and third quarters, 1962).

A number of significant results in addition to those listed above have been achieved during the past year. These include: (1) chloride content of standard production Kaylo has been reduced to the lowest point in history;

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LITHO IN U.S.A. DUPLICATING DIV. TOLEDO

The well opened, long fiber asbestos does cause processing problems. First, it increases the consistency of the batch thereby increasing the incidence of slip planes and pouring folds. Kaylo batches reinforced with such fibers seem to trap and retain a greater percentage of air bubbles. The latter show up in the finished product and are a source of customer complaint (product appearance). High amosite content batches also seem to dewater more quickly. Table III compares laboratory tilt drop ratings with those obtained on the No. 3 pilot plant line and those obtained on the regular No. 2 production pouring line. All were poured with "cores out." The batches poured on Line 3 (pilot plant) were mixed in the small Hydropulper and "bucket" poured.

Table III

Fiberizing Equipment	4" x 1" MPC Tilt Drop Ratings		
	Laboratory	Pilot Plant	Factory
Proctor & Schwartz Feeder & Picker	11.8	10.6	5.8 (3.8(1))
Proctor & Schwartz Carding Machine	9.5	8.6	4.4 (4.6(1))
Proctor & Schwartz Shredder	8.5	7.6	-
Devil Tooth Bauer Mill	5.7	-	(3.0-3.5)(1)
Sprout-Waldron	5.1	5.4-6.3	(3.7-4.8)(1)

(1) Factory result in parenthesis were obtained on samples poured with "cores in."

Today, asbestos fibers are being used successfully in a number of products competitive with Kaylo. Laboratory data indicates that major strength improvements can be obtained if well opened, long fiber amosite asbestos fibers are used as reinforcement. The problem preventing the realization of these improvements lies with the process. At the moment it is reasonable to assume that a product equal or superior to Thermobestos can be achieved with asbestos fibers, provided major modifications of the present process to prevent fiber damage are carried out.

All types of fibers, including asbestos, have certain advantages as well as disadvantages when used as reinforcement for Kaylo. Among the more important advantages of asbestos fibers are (1) low cost, (2) alkali and temperature resistance, (3) retention of strength at elevated (1200°F)

service temperatures, and (4) a wealth of technology available as to methods for processing and using such fibers in calcium silicate type products. The major disadvantages of using asbestos fibers in Kaylo are (1) less reinforcement value per pound of fiber as compared to glass, (2) brittle, easily damaged during processing, (3) increases batch consistencies and tendency to rope during pouring, (4) potential health hazard (asbestosis), (5) prices more susceptible to market fluctuations and world conditions (all imported from outside USA), and (6) questionable availability, especially amosite asbestos shipped from South Africa.

Vinyl Coated Glass Fiber Reinforcement

Evaluation of vinyl chloride coated glass insect screening gave the first real clue that glass fibers could be used as reinforcement for Kaylo. To prove the feasibility of this concept, it was deemed essential at the time that further evaluations of vinyl coated fibers be carried out. This was done with full knowledge that vinyl coatings could never be used where stress corrosion cracking of stainless steel might occur. It was hoped that engineering data collected from these experiments could be used for eventual plant scale up (regardless of the coating ultimately chosen for the glass). Of course, these experiments were conducted with the assumption that a chloride-free coating would be found eventually. Also, there was always the possibility that Merketing would decide to market two products, one especially designed for stainless steel (stress corrosion) applications, the other for improved handleability. Under these circumstances, the vinyl chloride coated fiber data would be available for immediate scale up at the plant.

There are a number of disadvantages of reinforcing Kaylo with vinyl chloride coated glass fibers. These include: (1) high chloride content, (2) high cost, (3) tendency to cause roping during pouring, (4) potential corrosion of Berlin processing equipment (stainless innerliners in three of the SID cylinders), and (5) elimination of Kaylo as a marketable insulation for stainless steel applications. There are also a number of advantages of using vinyl chloride coated fibers which under certain conditions far outweigh the disadvantages. These include: (1) more resistant to damage during processing, (2) flexible, (3) more adaptable to the Berlin process as it now exists, and (4) excellent adhesion (mechanical) to Kaylo. Vinyl chloride coated fibers like phenolic coated fibers are sensitive to maximum temperatures and minimum moisture contents in the ware during autoclaving. Vinyl chloride coatings are thermally decomposed when subjected to temperatures in excess of 450-500°F especially when the moisture content of the Kaylo drops below 30-40% by weight.

The major concern and cause for rejection of vinyl chloride coated fibers as reinforcement for Kaylo is the danger of stress corrosion of stainless steel (both at the plant and in the field). This danger does exist.