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JOHNS-MANVILLE RESEARCH CENTER

Memorandum M432-28

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KAYLO PLANT INSPECTION - BERLIN, NEW JERSEY, JULY 2, 1958

Following are observations made during the above mentioned visit. In some instances the answers to questions were not in complete agreement or did not check with other data. An attempt has been made in most instances to report on the most logical answer

Raw Materials

A. Fiber - By agreement formulations were not discussed. However by counting the bags set aside for a batch it was observed that three types of fiber are used in the formulation in approximately equal proportions. These are JM 6D and JM 4K chrysotile asbestos and W-3 amosite. The ratio of the amount of fiber to calcium oxide and silica could not be determined because portions of these materials had not been set aside.

B. Silica - Two sources of silica are used in each batch. These are Eagle Picher Celatom and a silica flour ground to +5 per cent on a 325 mesh screen. It was learned that these are used in equal proportions.

C. Lime - Bell Mine quick lime is used following slaking which is done just prior to making up the batch.

Batch Preparation

A. Fiber - The fiber receives no cleaning whatsoever but is wet milled in a Bauer mill. The statement was made that two mill settings were required, one for the asbestos and the other for the amosite. In neither case is the fiber given a severe milling. This was mentioned and was affirmed by examination of the finished product which showed a large number of fiber pencils.

B. Silica and Lime - For pan cast products none of the raw materials are weighed. Bag weights are accepted except for broken bags whose weights are checked and corrected. This is not the case for pressure molded products. Here the raw materials are accurately weighed. These batches are made separately in a different portion of the plant. This part of the process is discussed below.

C. Mixing Other Batch Preparation Details - All the ingredients are mixed together with water in the ratio of one part of solids to five parts of water. Fresh water is used since no water is recovered. The size of the batch is 30,000 pounds.

The slurry is heated to a temperature between 185 and 210F. There is no temperature control for pan cast products. However if the slurry is boiled, the resultant product is filled with voids and a high reject rate results. Again greater precautions are taken with the batches for molding. Here the temperature is controlled between 200 and 205F.

The only in process batch control for the slurry formation is a test which was said to be similar to our Hutto cake test. No other details concerning the test were discussed.

PLAINTIFF'S EXHIBIT K-1506

DEFENDANT'S EXHIBIT OF-77

Molding

A. Pan Casting - Slurry is pumped from a mixing to a send-out tank and then down to the molding pans. The slurry temperature at this point is approximately 100F. The slurry is run into the molds with nozzles which sprays it in ribbon form along the surfaces of the mold. Excess slurry is scraped off and returned to process. The slurry to the pipe molds is always fresh. All excess slurry is returned for use in block casting.

B. Pressure Molding - Pressure molding is restricted to intermediate size pipe covering. Here a metered amount of slurry is dropped into a bank of cylindrical molds. Next small metal rods dipped into mold and agitated the slurry to release any entrapped air. Following this cores were lowered into each cylinder and a pressure tight lid was lowered in place. The slurry in the mold was then subjected to a pressure of 15 pounds and a temperature of 275F for 7-1/2 minutes. This treatment allows the slurry to set sufficiently so that the cast piece could be removed from the mold and withstand subsequent handling prior to the final autoclaving.

Pre-autoclave Treatment

Both the pan cast and the molded pipe were placed in moist hot air chambers prior to autoclaving. Two reasons were given for this treatment; the first being to prevent drying out before autoclaving and the second being to increase the set so that the handleability would be increased. The Kaylo personnel stated that this step in the process could be bypassed without harming the product if autoclave space was immediately available.

Autoclave-Drying Treatment

Following the moist hot air treatment the molds containing the slurry and the pressure molded pieces were placed in autoclaves for pressure treatment and drying which are combined in one cycle. Exact details of this treatment were not divulged. However, it was learned that the entire autoclaving and drying cycle required approximately eight hours which compares to a 3-1/2 day time to autoclave and dry Thermobestos. It was also learned that the blocks were autoclaved at 150 psi and 350F. Following this pressure curing the tanks are heated as the pressure is released. This is accomplished by passing "Dow Therm" through heating coils which are part of the equipment of each tank. The temperature of the "Dow Therm" was noted to be 600F which leads to the conclusion that final drying is conducted at this temperature.

The final steps in the process are to remove the dried products from the molds, cut and trim each piece and finally package for shipment.

The molds are then cleaned with an air blast, painted with a parting compound, lined with cardboard and returned to the production line to be recharged with slurry.

K-20 Production

The production of K-20 was not shown to the group. However, it was learned that only one batch of K-20 is produced per day. Since a batch contains 30,000 pounds with a water to solids ratio of 6 to 1 and assuming a density in the final product of 12 lb per cu ft it is possible to make a rough calculation of the daily production volume of this product. This figure is 357 cu ft or 4300 board ft. Although this figure seems low, the production of K-20 visible on the floor of the plant and in the warehouse indicated that there is not much of this product produced.

It was learned that the main difference in formulation from regular Kaylo was in the selection of fibers. Here all amosite is used rather than mixtures of chrysotile and amosite.

The other important process difference was in the autoclave treatment. Rather than the 150 psi 350F treatment the high temperature phase is obtained with a 275 psi, 410F treatment. This is accomplished in a large autoclave which is also equipped with "Dow Therm" heaters. The total autoclaving-drying cycle is again 8 hours.

Conclusions

There are only two places in the process which appear to have any advantage over the Johns-Manville process. These are the raw materials used and the combined autoclaving drying cycle.

A schematic diagram of the process is enclosed.

L. R. Blair

L. R. Blair

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cc: C. F. Rassweiler, GH
J. B. Jobe, DH
T. H. Eaton, DH
R. W. Dobson, DH
J. B. McCarty, Mvl
E. R. Williams
A. B. Cummins
W. M. MacAlpine
J. C. Rademaker 2/6/58
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Schematic Flow Diagram for Kaylo Products