JM 425-G1

ASBESTOS FIBER FOR USE IN TRANSITE PIPE

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ASBESTOS FIBER FOR TRANSITE PIPE

Transite pipe is one of Johns-Manville's largest volume products, and happily one that is still fast growing. It has several important advantages over metallic pipe, the chief among which are improved resistance to corrosion, a high flow coefficient that is maintained in service, and economies of installation. These good qualities would be unimportant if the pipe were not strong enough to stand the loads imposed by normal and abnormal service.

The primary reason that asbestos fiber is used in Transite pipe is to give it strength. Since Transite Pressure pipe is continuously operating under internal hydrostatic pressure, and other types of Transite pipe are being continuously subjected to flexural and crushing loads by the earth back-fill and traffic over them, it is important to develop high strength. Those of you who are familiar with concrete work know that conrete is very strong in compression but weak in tension. Since our pipe is produced from portland cement it is necessary for us to reinforce it so it becomes strong in tension, and this is accomplished through the use of asbestos fiber which we use in the same way that steel is used for reinforced concrete work. Therefore, the most important characteristic that a fiber has is its ability to impart strength to an asbestos cement product.

To determine this strength-giving ability, sample test cakes are made varying the ratios of fiber to binder to enable us to evaluate strength development. The results can be plotted to enable us to compare fibers. A typical example using the 4TAX fiber and 6D fiber for comparative purposes shows the superiority of the 4 Grade fiber to the 6 Grade fiber for strength development (Figure 1). You will note that in general the strength of the product increases as the amount of fiber is increased, to a maximum point beyond which strength falls off as fiber is added.

The other important characteristic that a fiber has from a use standpoint is its ability to be dewatered. Transite pipe is produced by a wet machine process in which a slurry of portland cement, silica and asbestos fibers flows to a forming vat where a thin film is picked up on a rotating screen mold, transferred to a wool and cotton "felt" which carries it to the press section. Between the vat and the press section is a vacuum box which withdraws excess water from the sheet. The sheet is wrapped up under high pressure, lamination upon lamination around a steel mandrel whose OD is the desired ID of the pipe. Moisture is again removed from the sheet at this point under pressure. The moisture content of the sheet is critical in formation. If it is too high, the pipe will not consolidate properly, formation will be difficult and in some conditions, the pipe may break up in the machine. For a given set of conditions in which this is occurring, the only corrective measures which may be taken are to slow down the machine, pick up a thinner sheet and permit it to dry out more completely as it passes over the vacuum box. Poor filtration characteristics for a fiber, therefore, represent poor production rates on the pipe machine, and consequent higher product costs.

Filtration characteristics of the various fibers are checked in the formation of the test cake and by a modification of a freeness tester used by TAPPI.

All fibers used are also evaluated by the standard fiber tests run by M. S. Badollet. In general, the Q. S., McNett and air analysis tests are used only as references to identify true fiber, dust, rock and length of the various fibers, as an aid in clarifying shifts of fiber quality that may occur as time passes.

Since no one fiber possesses all the desirable characteristics, it is our practice to blend various fibers together to produce the near optimum blend at the best price. Currently, Transite pipe is using Blue (South African, Transvaal, and Australian), BC4T and Normandie 4T, C&G 3 and 4, Danville 4TAX and 6D20 and Munro 4Y. In the past the exact blend of these fibers used has been dictated not only by test work, but also by operating characteristics of the different portland cements as well as availability of the fiber.

In general, we use Blue, C&G, Munro and Vimy Ridge fibers because of good filtration characteristics, and Blue, C&G, and Danville for good strength characteristics. Danville fiber is slow filtering, but has good strength giving ability.

The fiber as received is weighed, mixed together in the desired formulation and given one pass through the vertical willow. All fibers are therefore given the same treatment. In this respect, our practice differs from the European practice which in general calls for selectively opening the different fibers in a Chaser mill or Kollergang according to their potential. We have not been able to prove any actual advantage to this more complex form of processing.

Figure 2 shows the shipments of Pressure and Sewer pipe by U. S. plants during the period 1950 through 1954 and the estimate for the present year. All indications are that with the increased acceptance of Transite pipe this upward trend will continue for some time to come. There is some discussion of increasing manufacturing facilities. Within the past few years, output has been at the maximum of production capacities. However, with improved manufacturing methods with essentially the same production equipment we have stepped up our production capacity, but this has not kept up with demand. Our Production Department anticipates that at least through 1958 our ability to produce will increase in line with the curve drawn through 1955.

The increased sale of pipe will mean that Transite pipe will use more and more fiber. A part of our Research and factory development program has been to increase the use of JM produced fibers. For several years the purchases of C&G fibers have been held to a minimum and no more are now being bought. While some is currently being used it is only that which is already on hand, to deplete our stores. Vimy and BC4T fibers have been used for some time, with Normandie fibers supplanting Vimy fiber at the end of 1954. Research has recommended and the Industrial Products Division has agreed to the recommendation that the purchase of these fibers be discontinued as soon as possible in favor of JM produced fiber. To what extent this will be followed is a policy decision and we have not been advised of that decision yet. If this recommendation is followed, it will mean in essence that Blue fiber will be the only outside purchased fiber, which coupled with increased production, should mean a tremendous increase in the usage of Danville and Munro fibers, grades 4.

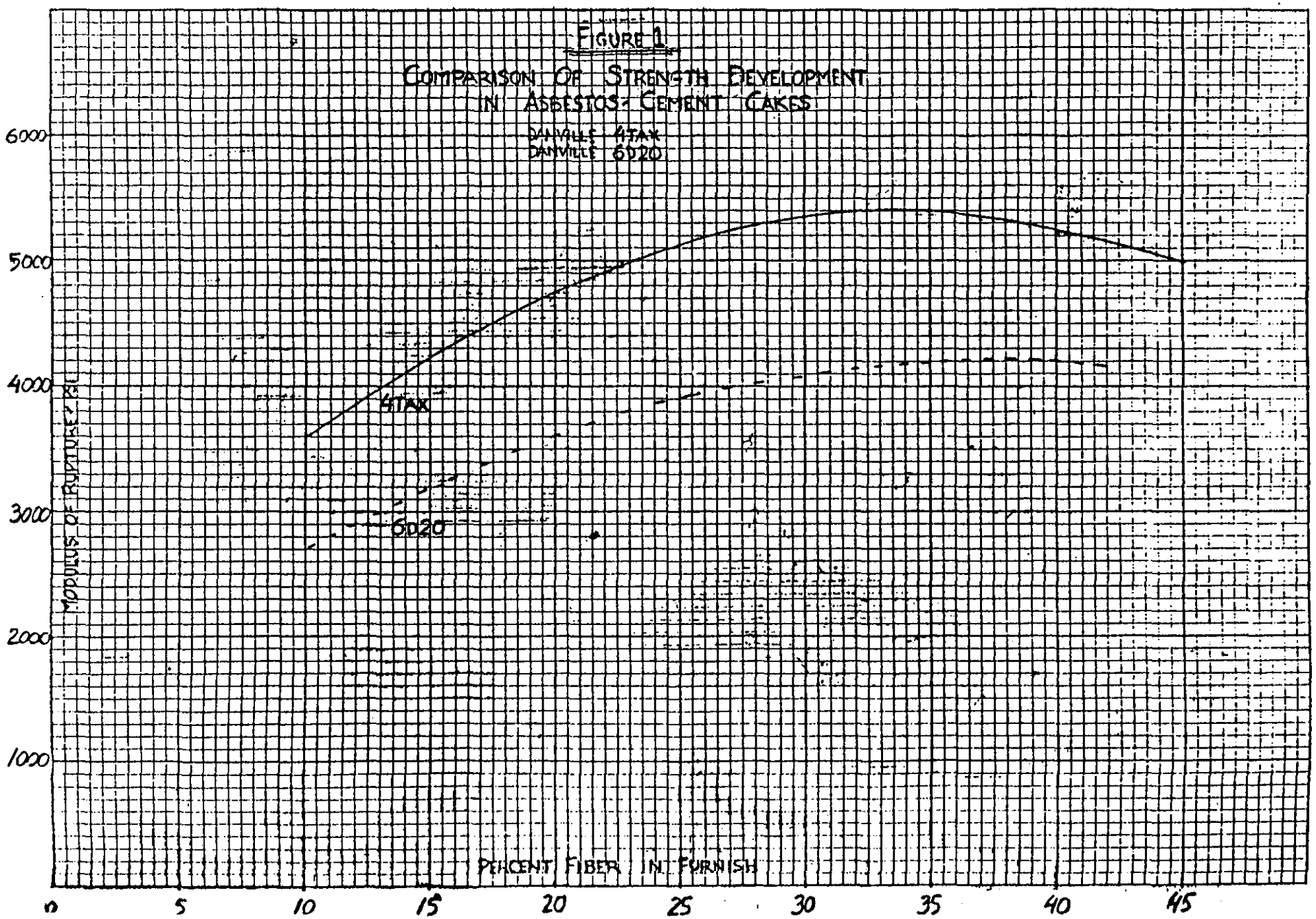
At the present time we are evaluating the fiber from the new Rhodesian mine. Results to date indicate that if it is used in Transite pipe, it may be as a partial replacement for Munro, due to its good filtration.

In our non-pressure pipe (and to a lesser extent in our Pressure pipe) we are learning to operate with small amounts of 6D20 fiber. This has necessitated some equipment changes, but the indications are that in the future we will be able to increase our use of the shorter fibers. At this point the timetable is indefinite.

We would not ask for any major change in fiber grades available for Transite pipe use. We do urge that everything possible be done to maintain the uniformity of the product, from bag to bag, and month to month. We know that this has been improved with the opening of the new mill, and we are in hopes that this product uniformity will continue.

FIGURE 1

COMPARISON OF STRENGTH DEVELOPMENT IN ASBESTOS-CEMENT CAKES



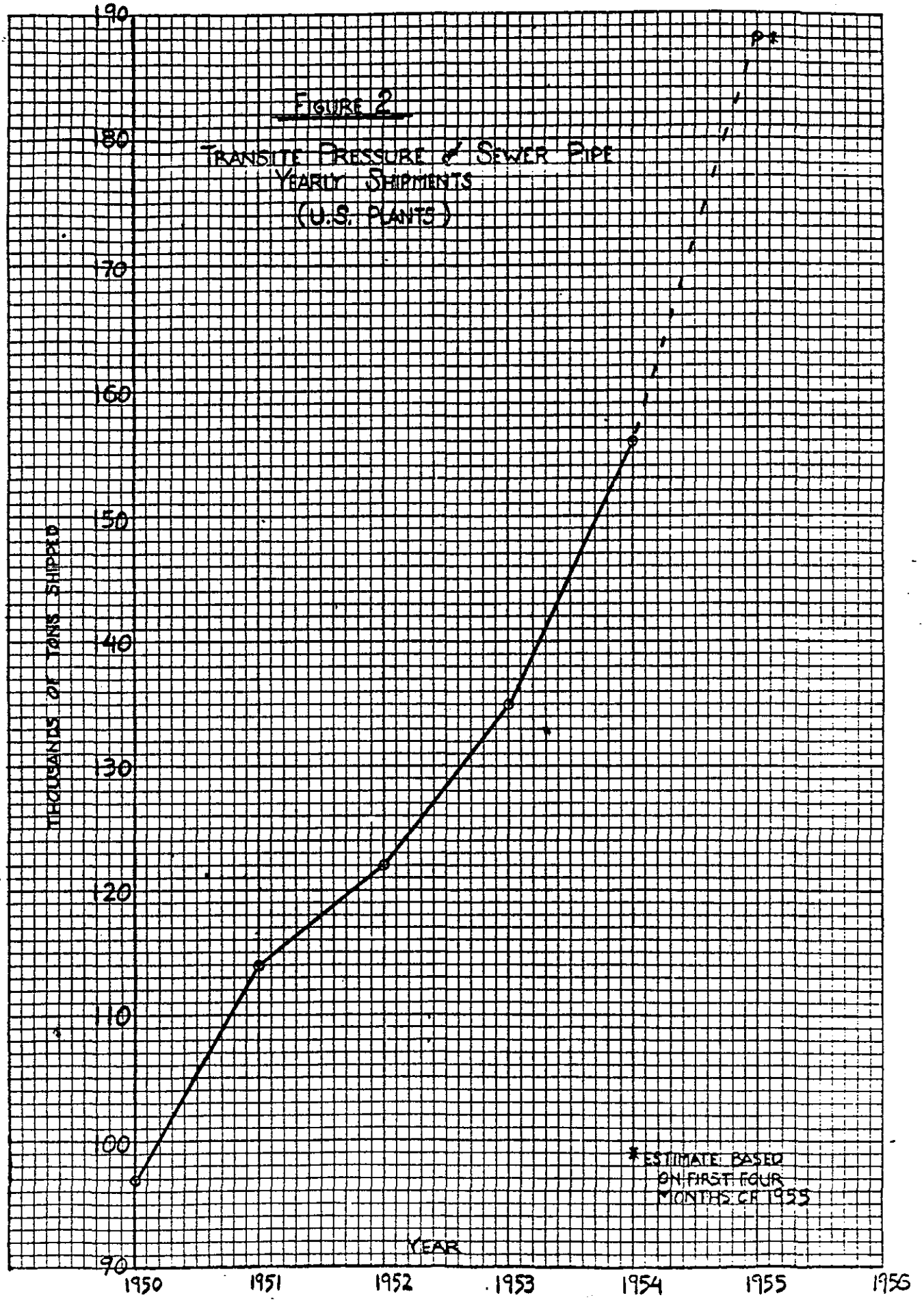


FIGURE 2
TRANSITE PRESSURE & SEWER PIPE
YEARLY SHIPMENTS
(U.S. PLANTS)
THOUSANDS OF TONS SHIPPED
190
180
170
160
150
140
130
120
110
100
90
1950
1951
1952
1953
1954
1955
1956
YEAR
P*
* ESTIMATE BASED ON FIRST FOUR MONTHS OF 1955