

## LETTERS

### Contamination During Sieving

To the editor:

There are many cases in which materials such as aggregates for mortar and concrete are required by applicable ASTM test methods to be separated into sieve sizes for use in subsequent testing. An example is the ASTM Test for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method) (C 227) in which specific fractions retained between the 2.36- and the 4.75-mm, the 1.18- and 2.36-mm, the 600- $\mu$ m and the 1.18-mm, the 300- and the 600- $\mu$ m, and the 150- and the 300- $\mu$ m sieves are to be prepared and blended for testing. When such testing is to be done, the sieves used are required to meet ASTM Specification for Wire-Cloth Sieves for Testing Purposes (E11), and the procedure used follows the ASTM Test for Sieve or Screen Analysis of Fine and Coarse Aggregates (C136) insofar as is applicable.

When material is prepared in sufficient quantity to make a number of tests in accordance with ASTM Test C 227 using the same aggregate with different cements, one typically uses in this laboratory a Gilson Company testing screen of the sort obtainable from numerous apparatus dealers that is as illustrated in Fig. 6 of Ref 1. Such apparatus has been in use in this laboratory for several decades and it was regarded as essentially foolproof so long as adequate care was taken to keep the screen cloth in good condition and to clean the sieves in between the times during which they were used for materials of different origins.

Recently, however, we had occasion to investigate the possibility of contamination and the 300- $\mu$ m sieve used in our apparatus was specifically examined. Figure 1 shows the sieve partially disassembled *after* being cleaned with high-pressure steam and dried. The material that is now visible was behind one of the end plates where it could not be removed during cleaning but was still able to contaminate subsequent samples. Once this condition was discovered the screen was carefully cleaned, reassembled, and used to sieve some additional material following which the side and end plates were again removed and again material was found lodged where it could not be removed by cleaning. Until other instructions become available, it is recommended that people using sieves of this sort disassemble the sieves between each sieving to avoid erroneous answers and contaminated samples.

Byrant Mather

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In response:

In reply to Mr. Mather's letter, I have several observations and comments relating to this situation. The Gilson Testing Screen is designed and recommended by Gilson for use in the 100- to 4.75-mm (4 in. to No. 4 sieve) particle size range. When the screen is used in this range, accumulation of material behind tray liners is not significant enough to affect test results. For fine series material sizes, Gilson recommends testing in 203.20-mm (8-in.) diameter sieves. Screening with the testing screen in fine sizes will not give

complete separation because of the type of agitation used in the design (vertical only—to separate larger sizes). We do sell tray sizes down to 75  $\mu$ m (No. 200) for those applications in which no other suitable machine is available or for situations in which complete separation and retention of material behind liners is unimportant.

Mr. Mather refers in his letter to sieves meeting the ASTM Specification for Wire-Cloth Sieves for Testing Purposes (E 11). Our screen trays cannot ever meet this specification because the frame description in ASTM Specification E 11 is written for round sieves of brass or stainless steel. The wire cloth in our trays meets the standards of ASTM Specification E 11, and our trays are so labelled.

Gilson screen trays have been manufactured in exactly the same manner insofar as tray liners are concerned for 41 years. When used as recommended, there have been no problems about retention of material behind liners that I am aware of. Retention of material behind tray liners in fine tray sizes does happen, and Gilson realizes this. We have resisted changing to a more sophisticated and costly tray design to eliminate the problem for the following reasons.

(a) Many of our customers are not screening for test purposes and are not concerned with ASTM standards. For this part of our market, an expensive tray design only serves to limit sales.

(b) Since we do not recommend use of this machine for testing accuracy work in fine sizes, why provide a tray to be used in this matter? This would tend to falsely imply that such an application is accurate and acceptable.

From the practical standpoint, we realize that special situations do exist in which a customer wants to use the Gilson Testing

FIG. 1—300- $\mu$ m sieve partially disassembled after being cleaned with high-pressure steam and dried.

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Screen for fine size testing or for fine size separations where contamination is undesirable. Sometimes sample quantities dictate use for a large capacity machine as the best method available even though the vibrating action is not ideal. In these cases, our customers have had fair success at sealing around the tray liners (both top and bottom should be done) with sponge rubber or a good grade of silicone-type tub and tile caulk. Some customers attach the material to the top and bottom edges of the liners only, and others use it as a caulk in the cracks. If bonded to both surfaces, of course, this means that the entire tray must normally be discarded when the wire cloth wears out.

We hope the above information will be useful and informative to Mr. Mather and his laboratory people. We also hope that any publication Mr. Mather makes of the Corps of Engineers experience with the contamination problem will also stress that the

application involved is outside of Gilson's recommended range of use for this machine. The situation really falls in the area of adapting the machine for use to special applications outside of the intended design range. The use of the Gilson Testing Screen in its intended design range is in no way affected by the conditions noted in Mr. Mather's letter and its inclusion in Ref 1 would still be appropriate.

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### Reference

- [1] *Manual on Test Sieving Methods: Guidelines for Establishing Sieve Analysis Procedures, STP 447A*. American Society for Testing and Materials, Philadelphia, 1972, p. 14.