

PREPARATION OF THE PULP.

Approximately 600 gm. of air-dry pulp are needed for each run. The pulp is first run through a coarse screen (No. 18 or 20). When the pulp is in a dry condition it will screen much faster if soaked in warm water for a short time before screening. The screened pulp is caught in small "box screens" and put in a coarse cloth bag. As much water as possible is pressed out in a wine-press. The pressed pulp is shredded, thoroughly mixed, and a representative moisture sample taken. The rest of the pulp is packed in one or two battery-jars and covered tightly to prevent change in moisture content. The moisture sample should be left in the oven overnight to ensure complete drying.

After the percentage of moisture in the pulp has been determined, an amount equivalent to 100 gm. of air-dry pulp is weighed out for each batch and placed in a battery-jar of 3-litre capacity. 2,000 c.c. of filtered tap-water, 22° to 25° C., is added to each jar, allowance being made for the moisture in the pulp, and the mixture kneaded with the fingers to ensure thorough breaking of all lumps. Usually five such batches are enough, although six or seven are sometimes necessary, depending upon the time required to reach a maximum bursting test.

PREPARATION OF THE BALL MILL.

If the room-temperature is greater than 25° C. or less than 20° C. it is advisable to run the mill a short time containing the stones and about 3 litres of water at the desired temperature, in order that the first batch may be run at the required temperature. With a variation of 2° or 3° in temperature the difference in the results of the tests is negligible.

The speed of the mill must be checked, and adjusted to 66 r.p.m. This is easily done with the aid of the counter fastened to one end of the shaft.

BEATING PROCEDURE.

Usually two different cooks are beaten at the same time, although one may be run with the same degree of accuracy. Time is saved by beating one cook in each jar.

One of the battery-jars containing the mixture of pulp and water previously prepared is dumped into one of the jars of the mill, together with the proper amount of pebbles. The other jar is loaded in the same manner. The covers are clamped on, and the mill set in motion. Successive batches are run for increasing periods up to 80 and sometimes to 160 minutes, depending upon the quality of pulp. Sufficient batches are beaten at 10- or 20-minute intervals to show that the maximum bursting-strength has been reached. Ordinarily batches are beaten for 20, 40, 60, 80, and 100 minutes, requiring 1,320, 2,640, 3,960, 5,280, and 6,600 revolutions respectively. The batches are best timed by the number of revolutions, this method being the most accurate.

MAKING THE HAND-SHEETS.

When the batch has run the required number of revolutions, the charge, consisting of pulp, pebbles, and water, is dumped from the pebble mill into a 10-quart pail, and the mill rinsed carefully with a hose, so that none of the fibres remain in the mill or are lost. The charge is dumped into a strainer which has been placed in the stone vat from which stock for the hand-sheets is dipped. The strainer is made of very heavy $\frac{1}{2}$ in.-mesh wire. The pulp is thoroughly washed from the pebbles and strainer into the stone vat, which is filled with water up to the 20-litre mark.

From the dilute suspension of pulp in the stone vat, six sheets are made by dipping 500 c.c. for each sheet in a copper measure. The sample is emptied into one of two 1-gallon measures. The measure is filled with water and the mixture poured back and forth from one measure to the other five or six times. The mixture is then poured into the deckle-box of the sheet machine quickly, and distributed evenly by moving the measure back, forth, and criss-cross. The drain-valve is immediately opened wide. The suction is allowed to continue for five seconds after the water is out of the deckle-box. The deckle-box is then turned back on its hinge, and the plate bearing the wire and sheet removed, turned over on a pile of moist felts, and pressed down. The plate and wire are lifted from one edge, leaving the sheet on the felt.

DRYING THE SHEETS AND PREPARING THEM FOR TESTING.

The test sheets are hung up on the felts in the drying-room and air-dried. The drying procedure is hastened by directing a current of air upon them by means of an electric fan. As soon as the sheets are thoroughly air-dried they are pressed in the letter-press for five to ten minutes to flatten them out. They are then trimmed on a paper-cutter to 5 in. by 7 in., and placed on the conditioning-rack in the humidity-room, with a relative humidity of 65 per cent. for two hours before testing. In that time they reach equilibrium, and are ready to be tested under the standard conditions of 65 per cent. relative humidity and a temperature of 72° F. From the six sheets the four best are selected and used for bursting and tearing strengths. One of the remaining sheets is used for folding and tensile tests, and the other sheet is filed with the test data.

BURSTING-STRENGTH TEST.

The Ashcroft tester is used for determining the bursting-strength. The four sheets are weighed on a balance to $\frac{1}{10}$ gm., cut diagonally, and eight tests made along the diagonal edges of each sheet,