

TECHNICAL NOTES

FOREST PRODUCTS LABORATORY

U. S. FOREST SERVICE

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EFFECT OF MOISTURE ON THE STRENGTH OF PAPER

When paper is bought and sold under strength specifications uniform and accurate results cannot be obtained unless the atmospheric humidity under which the tests are to be made is specified.

Many experiments were performed at the U. S. Forest Products Laboratory at Madison, Wisconsin, on various weights of 13 different papers made on ground wood-sulphite, all-sulphite and kraft furnishes. The tests were conducted in a constant humidity room after proper seasoning of the paper, for which 2-1/2 hours are usually sufficient. Tests were made at 41, 53, 64, 65, 77 and 82 per cent humidity, at approximately 70° F. The Laboratory's standard test condition is 65 per cent humidity at 70° F.

The results of the tests are as follows:

1. The bursting strength increases with decrease in humidity. Total variations in strength of from 21.5 to 30.0 per cent were obtained at varying humidities compared with the standard strength.
2. The breaking length, as tested by the Schopper machine, both across and with the machine direction decreases with increase in humidity. The papers tested showed a variation in breaking length of from 25.7 to 37 per cent from the standard strength.
3. The stretch of the papers both with and across the machine direction increases with increase in humidity.
4. The folding property of the paper is affected to greater degree by variations in moisture content than any of the other properties. For example, a commercial 60 lb. kraft paper at 44 per cent humidity withstood 968 double folds and at 82 per cent humidity showed a folding test of 6660 double folds. Some papers reached their maximum folding strength below 82 per cent humidity, showing that too high a moisture content may make paper too limber for maximum folding resistance.