# 100% Nonwood Fiber Content Papers - Part 4: Bleached Papers Physical Properties

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The data contained in the following table is from an excellent paper entitled "Industrial Experiences & Problems Involved In Stock Preparation & Papermaking Utilizing Non-Wood Fibrous Materials", written by D.K. Misra, Thessalian Pulp & Paper Industries Ltd., Larisa, Greece, and published in 1975 in the TAPPI Non-Wood Plant Fiber Pulping Progress Report No. 6.

This data was developed from tests on commercially produced paper and paperboards which were available at the time. Some of this data likely is a little outdated due to advancements in paper machine design such as improvements in Fourdrinier drainage and the development of twin wire paper machines and no-draw press sections, all of which allow for a high nonwood fiber fraction in the furnish. Nevertheless, this actual mill data still offers a valuable insight into the potential use of nonwood fibers in papermaking.

Unfortunately, since this paper was presented, no one has undertaken a similar ambitious project to determine the characteristics of currently available nonwood fiber content papers. With the renewed interest in nonwood fibers for papermaking in North America and Europe, perhaps the time has come for a research organization to undertake such a project.

The following table provides physical properties of **bleached papers produced using 100% nonwood pulps**. Even using pre-1975 technology, a few points to consider include:

- the overall strength properties of the paper seem to be satisfactory compared to paper produced with 100% woodpulp
- onionskin typewriting papers produced with 100% cotton fiber possess excellent strength properties and permanence, for which they are sold at premium prices

It is technologically possible to produce paper with 100% bagasse, wheat straw or reed pulps, but economically this is highly questionable because the paper machine speed typically must be reduced by 35-50% putting a serious limitation on achieving optimum production rates. However, the situation may occur periodically in some developing nations due to lack of long-fiber pulp. For a suitably designed paper machine (designed for this contingency), a production rate could be established at 75-80% level.

Regardless, adding 10-25% long fiber pulp is considered the most satisfactory method to maintain optimum production both for output and paper quality.

## Bleached papers produced with 100% nonwood pulps

| Paper Grade | Furnish | Basis Weight (g/m2) | Ash (%) | Thickness (microns) | Breaking Length (m) | Burst Factor | Tear Factor | Fold No. | Cobb (g/m2) | Porosity (sec/100cc) | Opacity (%) | Bright ness | Denison | Finish | % Hygro-Expansion | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bagasse** | | | | | | | | | | | | | | | MD | CD |
| Printing & Writing | 100% bagasse | 48 | | 70 | 3534 | 22.0 | 58.3 | 7.0 | | | | | | MF | | |
| Printing & Writing | 100% bagasse | 52 | | 72 | 3675 | 22.0 | 63.5 | 16.0 | | | | | | MF | | |
| Printing & Writing | 100% bagasse | 62 | | 86 | 3860 | 23.1 | 56.5 | 12.5 | | | | | | MF | | |
| Printing & Writing | 100% bagasse | 71 | | 120 | 4296 | 24.6 | 61.8 | 28.5 | | | | | | MF | | |
| Printing & Writing | 100% bagasse | 75 | | 119 | 4280 | 24.5 | 74.7 | 39.0 | | | | | | MF | | |
| **Reed** | | | | | | | | | | | | | | | | |
| Printing | 100% reed | 80 | 10.1 | 170 | 2670 | 9.0 | 47.3 | 2 | 21 | 9 | 96.0 | 70.0 | 4 | MF | 0.4 | 2.1 |
| **Straw** | | | | | | | | | | | | | | | | |
| Printing & Writing | 100% wheat straw | 70 | 9.8 | 101 | 4430 | 22.6 | 56.1 | 16 | 24 | 184 | 85.0 | 89.5 | 12 | MF | 0.5 | 3.0 |
| Printing & Writing | 100% wheat straw | 70 | 8.0 | 90 | 5390 | 29.4 | 45.5 | 38 | 29 | 334 | 84.0 | 91.0 | 13 | SC | 0.6 | 3.6 |
| Printing & Writing | 100% wheat straw | 80 | 10.3 | 105 | 3400 | 20.1 | 50.9 | 7 | 20 | 100 | 91.0 | 74.0 | 11 | MF | 0.5 | 2.7 |
| **Cotton** | | | | | | | | | | | | | | | | |
| Writing | 100% cotton | 34 | 0.4 | 55 | 6640 | 40.5 | 149.5 | 360 | 18 | 1060 | 53.0 | 92.0 | | MF | | |
| **Wood-based Papers for Comparison** | | | | | | | | | | | | | | | | |
| Manifold | 100% woodpulp | 30 | 5.0 | 60 | 4770 | 21.0 | 66.0 | 60 | 18 | 56 | 51.0 | 84.0 | | MF | | |
| Writing | 100% woodpulp | 45 | 5.8 | 62 | 5780 | 35.1 | | 33 | 16 | 45 | 63.0 | 91.0 | 7 | MF | 0.2 | 2.1 |
| Writing | 100% woodpulp | 60 | 10.7 | 80 | 4440 | 22.8 | 52.0 | 30 | 17 | 34 | 76.0 | 90.0 | 7 | MF | 0.2 | 1.6 |
| Writing | 100% woodpulp | 70 | 9.5 | 100 | 3860 | 15.0 | 54.0 | 13 | 18 | 68 | 82.5 | 94.0 | 12 | MF | 0.2 | 1.8 |
| Writing | 100% woodpulp | 80 | 8.5 | 106 | 3730 | 17.3 | 56.0 | 32 | 19 | 29 | 85.0 | | 11 | MF | 0.2 | 1.9 |
| Offset Printing | 100% woodpulp | 75 | 10.2 | 96 | 5080 | 30.2 | 66.7 | 95 | 24 | 49 | 85.0 | 87.0 | 14 | MF | 0.1 | 1.7 |
| Offset Printing | 100% woodpulp | 80 | 5.6 | 105 | 4530 | 21.2 | 42.0 | 50 | 18 | 49 | 83.0 | 77.0 | 12 | MF | 0.2 | 1.5 |
| Offset Printing | 100% woodpulp | 90 | 12.0 | 130 | 4100 | 20.4 | 44.0 | 35 | 18 | 29 | 90.0 | 83.0 | 11 | MF | 0.3 | 2.2 |
| Offset Printing | 100% woodpulp | 100 | 12.1 | 130 | 4040 | 21.0 | 44.0 | 58 | 18 | 83 | 90.0 | 84.0 | 12 | MF | 0.2 | 2.0 |

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