

CELLULOSE MEDIA AND WET-LAID NONWOVENS

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SUMMARY AND HIGHLIGHTS

These are the markets and applications in which cellulose fibers are being currently used in filtration:

Automotive engine filtration	110,000 – 115,000 tons
Vacuum cleaner bags	25,000 tons
Coffee filters	120,000 tons
Tea bags	6,000 – 7,000 tons
Laboratory filter paper	14,000 tons
Industrial/liquid filtration	<u>29,000 tons</u>
Total	<u>300,000 tons</u>

We believe that worldwide for filtration, approximately 290,000 – 300,000 tons of softwood and hardwood cellulose fibers are being consumed, approximately 80% are from North America and Europe. This is based on total consumption of at least 350,000 tons of media, of which 20% is represented by different resins and other synthetic fibers.

After carefully consulting with 4 – 5 of the largest users of cellulose fibers, we concluded that tons are mercerized and the balance and majority is based on non-mercerized cellulose.

We have found that particularly the large manufacturer of cellulose media depends on consistent quality, which is extremely important to them. They do not purchase cellulose fibers on the spot market and do not seem to easily change suppliers.

Depending on applications and also companies, 60% of all cellulose fibers for filtration is based on Southern Pine softwood and approximately 40% on hardwood. This is, however, highly depending on media suppliers and end-use market applications.

Air porosity or air permeability is crucial for applications like automotive engine paper, but such characteristics is entirely depending on fiber mixture and not 'bale' related.

Bleached fiber is, for instance, used to a larger extent in Europe, particularly for automotive engine filter media as compared to North America. European automotive filter element suppliers and the automotive industry prefer 'white' paper.

Prices have increased since we started our investigation in mid February 2003, when non-mercerized cellulose fiber was mentioned in the ton ranges. Prices had increased by mid March to at least ton for the same fiber. Mercerized fiber was mentioned to cost ton and is now at least ton higher. The strong Euro had also some bearing on prices quoted in U.S. dollars. Obviously, bleached fiber is, basically sold at the same price, but we were told that cotton linters, specialty pulps and synthetic fibers are getting increasingly more attention, but also increase the raw material price base.

We have a list of manufacturers of cellulose filtration media worldwide enclosed with this report. Recent mergers have reduced the numbers of companies competing, particularly in Europe, but also in North America. We are also discussing major markets in this report.



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