

APPLICATION SHEET

Paper / Wood – DMA EPLEXOR®

Influence of Humidity on the Dynamic-Mechanical Properties of Paper

Products Made of Paper

Products made of “paper” like nonwovens for household applications, coffee filters, etc., are common products used in every household every day. However, industrial applications such as fuel filters, industrial filters for chemical applications, nonwovens for sausage casings made of “paper” also play a decisive role. Thus, the required mechanic and thermal properties for different applications made of paper/paperboards are frequently in contradiction to each other.

Nonwovens in Household Applications

Nonwovens used in the kitchen shall, of course, be stable and tearproof. Important requirements for nonwovens should feature good “sucking” or absorption properties in order to remove undesired “liquids” from any surface (e.g., tables, plates). Unfortunately, the stability and tensile strength of nonwovens will be significantly reduced due to absorption of liquids. These characteristics can easily be determined with the DMA technology.

DMA Investigations on Dry and Wet Nonwovens

To this end, a commercially available nonwoven was investigated by means of DMA.

The measurements were carried out on dry and wet test stripes at ambient temperature in the tensile mode (test frequency: 10 Hz).

For both the dry and wet specimens, a static load of 2 N was applied. In addition, a dynamic oscillation with an amplitude of ± 0.5 N was superimposed.

The influence of the humidity directly causes a reduction of the stiffness (E') of more than 60%.

The inner damping ($\tan\delta$) also changes. The viscosity increases of more than 40% due to the humidity absorption.

The wet nonwoven was humidified with steam (approx. 95% rH) shortly before the measurement. During the measurement, the nonwoven dries. The large surface area of the nonwoven causes a high vaporization rate of the amount of liquid absorbed.

The storage modulus increases and the damping value decreases. Both measurement data approach the dry state.

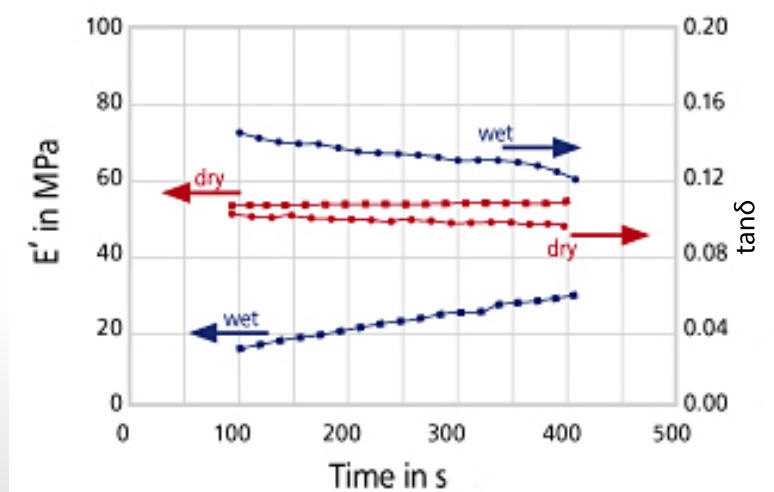


Fig.: Test result on the dry and wet nonwoven