Determination of Fiber Support Index (FSI) and Drainage Index (DI)

Purpose

the Fiber Support Index (FSI) establishes a basis common to all woven fabric designs by which various design options can be assessed for a particular paper machine. The FSI is a model to characterize the interactions between the fiber mat and the fabric design for purpose of ranking fabrics according to their ability to support fiber on the top surface of the fabric i.e. their resistance to fiber embedment tendencies.

Fiber Support Index and Drainage Index

Definition

FSI is defined by the following fabric parameters:

- *Number of machine direction yarns per cm. (**Nm**)*
- *Number of cross-machine direction yarns per cm. (**Nc**)*
- *Weave type regarding yarn orientation on the forming side of the fabric giving coefficients of support from machine yarns (**a**) and cross-machine yarns (**b**).*
- *Support is given when a strand binds:*
  - *On the top surface between two crossing yarns.*
  - *Up or down between two crossing yarns belonging to the top surface of the fabric.*
- *The coefficients (**a**) and (**b**) are expressed in numbers of supporting points as fractions of the total repeat of the crossing yarn system.*
- *The FSI is a theoretical technique for evaluation and no testing equipment or conditions are involved.*

FSI calculation

$$FSI = 1.693 (a*Nm + 2*b*Nc)$$

Where:

a *= Coefficient for contribution of support from yarns in machine direction.*

Nm *= Number of machine directed yarns per cm of width on the paper side of the fabric.*

b *= Coefficient for contribution of support from yarns in cross-machine direction.*

Nc *= Number of cross-machine directed yarns per cm of length on the paper side of the fabric.*

Calculation of the drainage index (DI)

The drainage index combines air permeability with coefficients calculated for the FSI. It is expressed as follows:

$$DI = 0.585^{*} (b^{*}Nc^{*}Perm)$$

b = *Coefficient for contribution of support from yarns in cross-machine direction.*

Nc = *Number of cross-machine directed yarns per cm of length on the paper side of the fabric.*

Perm = *Air permeability in m/s (see E4)*