Recommended minimum dryer pocket air requirements

Scope

This Technical Information Paper (TIP) provides instructions for calculating the theoretical air volume requirements to achieve recommended average pocket humidity in two-tier dryer sections with conventional top and bottom dryer fabrics.

Safety precautions

This TIP covers an airflow calculation. There are no safety precautions that apply to this TIP.

Contents

Pocket ventilation involves the introduction of hot, dry air into a dryer pocket, using an air distributing roll or a cross-machine duct commonly referred to as a pocket ventilator. This ventilation results in a simple mixing process of the supply air that is introduced into the pocket and the water vapor leaving the sheet in the open draws between dryers. This mixing process is represented by the following mass balance equations:

$$(Q_s / V_s) (H_s) + E_v (\pi D) = (Q_s / V_s) (H_m) \qquad (1)$$

or

$$Q_s = E_v (\pi D) V_s / (H_m - H_s) \qquad (2)$$

where:

Q_s = Air volume introduced into pocket, (ft³/min)/ft of dryer width [(m³/min)/m of dryer width]
H_m = Absolute humidity of mixture, lb of water/lb of dry air [kg of water/kg of dry air]
D = Dryer diameter, ft [m]
E_v = Evaporation rate, lb of water/min·ft² total dryer surface [kg of water/min·m² total dryer surface]
H_s = Supply air absolute humidity, lb of water/lb of dry air [kg of water/kg of dry air]
V_s = Supply air specific volume, ft³/lb of dry air [m³/kg of dry air]
π = 3.1416

Note that if the evaporation rate (E_v) represents the average evaporation rate, as calculated using TIP 0404-07, then the calculated supply air volume represents the average flow rate for each dryer. If, on the other hand, the evaporation rate (E_v) represents a local evaporation rate, then the calculated supply air volume represents the flow rate for that local dryer. The local evaporation rate may be considerably different from the machine-average rate,