



Pre-Shrinking Parameters for Polyester Films

The shrinkage of Melinex® film under a given set of thermal conditions can be reduced, if not eliminated, by a technique commonly known as preshrinking. This technique can be employed to improve the dimensional stability of standard or specialty polyester films in order to meet the very tight dimensional tolerances required for membrane switch manufacture.

Melinex films of the type used in membrane switch manufacture normally exhibit shrinkage levels of up to 3% in the machine direction (MD) and 2% in the cross machine or transverse direction (TD), when exposed to thermal conditions of 190°C for five minutes. Shrinkage at ink drying temperatures of 90°C – 150°C will be lower than that of 190°C for five minutes; however, shrinkage may still be above the 0.1% or lower levels often required for proper registration. Proper preshrinking can reduce the dimensional change of Melinex films to zero or near zero levels under these thermal conditions.

BASIC PRESHRINKING PARAMETERS:

TEMPERATURES

Temperatures of 90°C-200°C are recommended, depending upon the level of stabilization (at process temperatures) required.

TIME

Sufficient residence time under preshrink conditions is required for heat transfer. For a given preshrinking operation, this is usually determined empirically. It should be noted, however, that once the film reaches the desired temperature, shrinkage occurs rapidly (within five minutes).

TENSION

Maximum preshrinking efficiency is obtained on completely unrestrained film, (i.e. flat sheets on a conveyor belt); therefore, in a continuous web process, it is advisable to use the absolute minimum tension that is practical.

GENERAL RULES:

- (1) Preshrink temperatures must exceed (by 15°C - 30°C) final processing temperatures.
- (2) Temperature is a much more important parameter than time. Extended exposure to preshrink temperature equal or below final processing temperature will generally not achieve the desired results.
- (3) Preshrinking may affect some physical properties of Melinex polyester film. We suggest that you test to determine if the finished product continues to meet the end use specification.



Pre-Shrinking Parameters for Polyester Films Continued

.An example of sheet stabilization would be running the sheets down a conveyor oven set at a temperature that is 20°C higher than the highest ink drying temperature. The conveyor speed should be set so that the sheet temperature would reach equilibrium at about 75% of the way through the oven. As always, we strongly recommend that the customer trial under their own manufacturing parameters. The information we've provided you should be used a guide when determining proper preshrinking conditions.

COMMERCIAL & TECHNICAL CONSIDERATIONS:

- 1) Empirical testing may be required to determine the best time and temperature for annealing to suit a specific process, film thickness, and manufacturing lot
- 2) Film manufacturers generally do not warrant film if problems arise as a result of self-stabilization as several unpublished film properties are being altered

Finally, should pre-shrinking within your process prove to be unworkable, Tekra offers a full line of DuPont Teijin pre-stabilized ST Films for your consideration.

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