

Technical Tuesdays

REF:TT/April 2011/ WK 2

Wrinkle Free finish application - an easier approach

Wrinkle free finish:

- The wrinkle free finish (also known as “Easy Care”, “Durable Press”, “Wrinkle-Resistant”, “Wash and Wear”, “No-Iron” etc) is obtained by cross-linking cotton.
- cross-linking takes place between adjacent cellulose polymer chains, these give cotton some elastic and resiliency properties.
- Such cross-linked cotton can recover from deformation stresses and thus wrinkles will not form. Even today, DMDHEU is the main cross-linking agent. With magnesium chloride as the acid catalyst to initiate a reaction, it forms cross links in the amorphous regions of the fibre.

The primary effects of Easy care/wrinkle free finish are:

- Reduction in swelling and shrinkage
- Improved wet and dry wrinkle recovery (*CRA)
- Smoothness of appearance after drying.
- Retention of intentional creases and pleats.

In addition to the dimensional stability properties, the sheen of calendered fabrics (permanent chintz) and the stand and hand of pile fabrics are generally improved by resin finishes.

Types of technology for achieving “wrinkle free” finish:

The major application methods currently used are based on the following processes:

- pre-cure;
- post-cure;
- garment-dip;
- spray (metered) application;
- and vapour phase.

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Technical Tuesdays

In pre-cure, the fabric is treated with resin, dried and cured in flat open-width form. This fabric can be used to produce garments that resist wrinkling during wearing and have a smooth appearance after washing and tumble drying.

Pre-cure process normally follows one of the below application methodology:

- Classical dry cure process (pad-dry-cure)
- Rapid cure process (pad-shock cure)
- Low temperature Cure (pad-dry100°C-Cure130°C)
- Moist Cure process (pad-dry with 7-10% moisture-batch-wash-topup)

Such pre-cure fabrics usually find application in the womenswear market for some skirts, casual trousers and shirting where smoothness is the main criterion.

Comparison of the different pre-cure resin finish processes

Application process	Fabric humidity in %	pH of the finishing liquor	Amount of resin in the recipe in g/l	Curing temperature in °C	Curing time	Shape of the fibre	Effect/strength relation	Washing after curing necessary	Suitable for reactive dyed goods
Classical dry curing	0-2	3.5-5	30-80	140-160	3 mins	Non-swollen	Good	No	Yes
Rapid curing	0-1	3.5-5	30-80	150-190	30-10 secs	Non-swollen	Good	No	Yes
LT-Cure process	0-3	2-4	150-200	130	1.5 mins	Non-swollen	Good	Yes	Yes
Moist-Cure	7-10	0.5-1.5	150-200	25-35	20-24 hrs	Partly-swollen	Very good	Yes	No

Depending upon the existing machinery setup and the end use requirement, any of the above mentioned process can be adopted for a better wrinkle free performance.

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Effects of classical dry-cure/rapid cure/moist cure conditions on fabric properties

“Dry” curing, short times at high temperatures.	“Wet” curing, long times at low temperature
Loss of tear strength and abrasion resistance.	Good tear strength and abrasion resistance
High dry creasing angle	Lower dry creasing angle
Lower wet crease recovery angle	High wet crease recovery angle

Choosing fabric for “wrinkle free” finish

For producing an acceptable wrinkle-free garment, several precautions must be taken in fabric selection:

- (a) The base fabric must have sufficient strength to withstand 40-60 per cent loss in tensile and tear strength and still maintain sufficient strength to provide a garment of acceptable wear life and durability
- (b) It must also have excellent absorbency to allow resin to penetrate into the very interior of the fibres and form crosslinks. Surface adhering resins do not serve any useful purpose and are inefficient and wasteful
- (c) If the fabric is dyed the dye must be fast to acid catalysis and high temperatures. Sulphur dyes, which are known to generate acid upon storage, are to be strictly avoided
- (d) Residual extractable on the fabric (like starch from size) can react with resin and lower its effectiveness, a high degree of size removal is thus essential
- (e) fabric pH should be between 6.5 to 7.0 with an alkalinity of less than 0.05 per cent (expressed as sodium hydroxide).

....To be contd

“Have a happy week ahead”

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