

Improvement of Tear Strength on Ultra Light Fabric

Jaewoo Jeon, Dongkwon Kim, Jongwoo Lee* and Sungwook Nam*

Korea Dyeing Technology Center, ST WONCHANG CO.,LTD.*

E-mail: texjjw@dyetec.or.kr

1. Introduction

Nylon Thin Fabric is used with Down Proof, Wind Stopper and Sleeping Bag. The Japanese product and technique guide a world market. Compared to the domestic highest product, Japanese product on quality and functionality is visible a big difference.

Lightness, thickness, tear strength, air permeability and touch of Domestic Nylon thin fabric compared to the world's best products is not good. In particular, Tear strength is not half of the world's best.

The primary reason which qualities of the domestic Nylon thin fabric are insufficient is a lack of understanding about the morphology of nylon material with heat, tension, moisture.

This study was carried out to establish the dyeing process of improvement of tear strength.

Table 1. Compared with a world-class technology.

		The world's best	Highest level of domestic
Q u a l. &	Lightness	26g/m ²	45g/m ²
	Thickness	0.2mm	0.3mm
	Tear strength	2.5lbf	1.2lbf
F u n c.	Air permeability	1cm ³ /cm ² /sec	7cm ³ /cm ² /sec
	Touch	Very Soft Touch	Hard Touch
Cost		\$6/m ²	\$3/m ²

2. EXPERIMENTAL

2.1 Specimens

100% Nylon(OCFD-002 : N/F 20/20 SD × N/F 20/20 SD, OCFD-003 : N/F 20/6 SD × N/F 20/6 SD)

2.2 Process

Typically, Nylon thin fabric was dyed with Jigger type. But this process has some problem which is loss of tear strength, dyeing mottled, listing.

In this study, Scouring and dyeing was progressed on new process of Jet type(Rapid type) in low temperature.

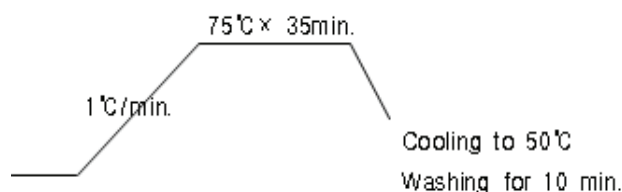


Fig. 1. Scouring process on new process of Jet .

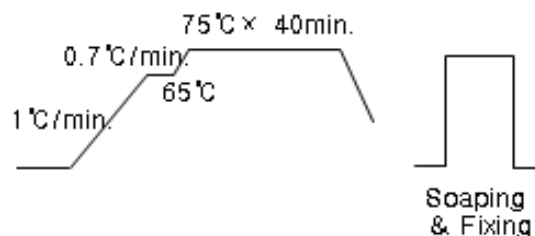


Fig. 2. Dyeing process on new process of Jet .

2.3 Measuring of Tear strength

Tear strength was determined by the pendulum method according to KS K 0535.

3. RESULT

Typically, nylon thin fabric is pretreated and dyed on machine of jigger type. In this process, In order to prevent to listing and dyeing mottled, dyeing temperature must be maintained at 95°C. Because of a tension and high temperature(95°C), tear strength is lost. This study carried out jet type process in low temperature(75°C) to maintain tear strength of raw fabric.

Pretreatment and dyeing was attempted to improve tear strength on the jet type process. Tear strength was higher achieved on jet type process compared to jigger type. Also, we got a soft touch. This is thought with fact that fabrics receive a tension when dyeing on jigger type process. Table 2, 3 shows the facts that tear strength which dyed on new process is higher than conventional process.

Table 2. Properties of OCFD-002 dyed on new and conventional process.

New process(Jet type)					
	Wide (inch)	Density (T/in)	Weight (g/m ²)	Tear strength (lbf)	
				Warp	Weft
Raw fabric	60.5	168	38.7	3.4	2.0
Dyeing	56	182	40.6	3.2	2.0
Finishing	57.5	178	37.8	3.8	3.0
Conventional process(Jigger type)					
	Wide (inch)	Density (T/in)	Weight (g/m ²)	Tear strength (lbf)	
				Warp	Weft
Raw fabric	60.5	168	38.7	3.4	2.0
Dyeing	57.5	170	40.2	2.4	1.2
Finishing	58	170	39.6	2.6	2.0

Table 3. Properties of OCFD-002 dyed on new and conventional process.

New process(Jet type)					
	Wide (inch)	Density (T/in)	Weight (g/m ²)	Tear strength (lbf)	
				Warp	Weft
Raw fabric	62	118	33.6	2.5	1.6
Dyeing	59.5	128	34.6	2.5	1.8
Finishing	61	126	32.4	3.7	2.9
Conventional process(Jigger type)					
	Wide (inch)	Density (T/in)	Weight (g/m ²)	Tear strength (lbf)	
				Warp	Weft
Raw fabric	62	118	33.6	2.5	1.6
Dyeing	59.5	122	33.4	1.8	1.0
Finishing	61.5	122	32.4	2.2	1.6

4. DISCUSSION

In this study, we got a high quality of nylon thin fabric. In particular, Tear strength was improved more than 2.5lbf which is the world best level. But, Additional research is needed for improvement of rope crease, limited selection of dye which follows in low temperature dyeing, dyeing mottled, etc.