Development of highly sensible wool mixed fabric with conjugated texturing and yarn dyeing technologies

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1. Abstract

Recently the demand for wool has been gradually decreasing due to global warming, oil depletion, Coolbiz campaign to reduce CO2 emission, and preference for business casual wear, while the price for wool materials has been constantly increasing. Wool, characterized by the natural touch and unique sensibility, is considered as one of the best natural materials, including silk. For wool, currently Korea almost depends on import from foreign countries. Therefore, 100% wool products cannot be competitive in terms of pricing and current trend. To secure sustaining competitiveness in the fiber market, it is required not only to develop new wool materials that enable expression of new sensibility that cannot be expressed by conventional wool fibers, but also to pursue differentiation of fundamental sensibility and functionality by highlighting advantages for wool as a natural fiber but by reducing its disadvantages through dominant conjugation with synthetic fibers. This study attempted to improve the technology of differentiating wool-like synthetic fibers such as polyester and combine technology with sensibility through mixing with wool materials. It also aimed to develop wool-like stretch materials and pre-treating and yarn dyeing technologies that enable fabrics to main natural wool-like touch and stretch, and ultimately to develop wool mixed fabrics that have new sensibility and functionality.

2. Introduction

2.1 Preparation of conjugated yarn

The Murata 33H was used to develop a conjugated yarn, with yarn speed, draw ratio, and air pressure set to 600m/min, 1.01, and 3kg/㎠, respectively. The temperature of the 2nd heater was changed to 160℃, 170℃, 180℃, and 190℃.

2.2 Yarn dyeing

To identify an optimal process during the yarn-dyeing preparation process, the hardness was measured by means of a hardness tester, and the bulge was observed. In this test, the conditions for vacuum setting were 90℃ and 30 minutes.

2.3 Weaving

Weaving was done using a rapier loom was used for weaving, with yarn-dyed ITY 90/66 used as warp and weft, respectively, warp and weft density set to 97 and 86 per inch, respectively, 2/2 twill texture, and 64-inch grey width.

3. Conclusions

The ITY 90/66 showed the highest 29.5% of crimp recovery when the temperature of the 2nd heater was 170℃. During the yarn-dyeing preparation process, the hardness after soft winding increased as the winding tension increased from 1 to 5. The same result was shown after vacuum setting. In particular, the bulge became greater after vacuum setting. As the traverse variation increased from 35% to 50% when the tension was 2, the winding hardness slightly increased but the bulge could be improved. The 2/2 twill fabric, with ITY 90/66 used as warp and weft, showed excellent elasticity with 9.3% elongation to the warp direction and 17.1% elongation to the weft direction, and appearance similar to wool fabric.

Table 1. Change of Hardness and Bulge After Soft Winding and Pre-Setting of ITY 90/66

No.	Tension (cN)	Traverse variation(%)	Inclination(°)	Hardness	
				After soft winding	After pre-setting
1	1	35	60	40	50
2	2	35	60	43	-
3	2	50	60	48	60
4	5	35	60	53	63

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