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Influence of Fiber Type and Laundering on the Thermal Properties of Spray Bonding Nonwovens(SBN).

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INTRODUCTION

The role of nonwovens in providing thermal comfort to human beings has led to in-depth studies of their thermal-insulating performance. Slater[1-2] has reviewed many paper dealing with the heat-transfer characteristics of textile materials. As a result of complex fiber/air-matrix structure, heat is transferred through textile materials by a combination of conduction by the fibers, conduction by the intervening air, thermal radiation and convection, and thus the mechanism of heat flow through textile material is a complex one.

The objectives of this paper were to compare thermal insulation properties of four spray bonding nonwovens with different types of fibers which are applied to the pad materials of clothes, to evaluate change in thermal insulation after laundering treatment and to determine the relationship between thermal insulation properties and structural changes after the laundering process.

EXPERIMENTAL

Spray bonding nonwovens(SBN) were made from four different polyester staple fibers and three different basis weight(Table 1). The web was cross-laid and spray bonding. Acrylic acid ester was used bonding agents and the sample was dried with 180℃ by using a heat chamber. To investigate the laundering effect, the specimen were laundered and dried according to KSK 0466 procedure.

Table. 1 Sample characterization

Sample ID	Carrier fiber	Denier	Fiber length(mm)	Basis weight(g/m^2)
RP	Regular fiber	2	51	80, 100, 130
FP	Fine fiber	0.7	38	50, 100, 110
HP	Hollow fiber (1hole)	3	51	60, 90, 100
MP	RP(70%),HP(20%), Conjugate fiber 4d, 51mm(10%)			60, 80, 100

The weight and thickness of sample were measured according to ASTM D1910 and ASTM D1777, respectively. ASTM D1518 provided the working basis for the intrinsic thermal conductivity(k) and thermal resistance(R) measurements and the thermal properties tests were performed using a KES-F7 THERMO LABO Ⅱ, consisting of heated plate, guard ring and bottom plate.

RESULTS AND DISCUSSION

The effect of fiber type and number of laundering on the thickness of SBN are presented graphically in Fig. 1. Except HP SBN, most of the SBN increased in thickness after second laundering and then decreased with number of laundering. Data presented in Fig. 2 shows that after second laundering the thermal resistance of SBN increased and HP SBN was found to provide the highest thermal resistance.

Generally, after second laundering the thickness and thermal resistance of SBN were increased and the enhanced thermal insulation is associated with increase in fabric thickness.

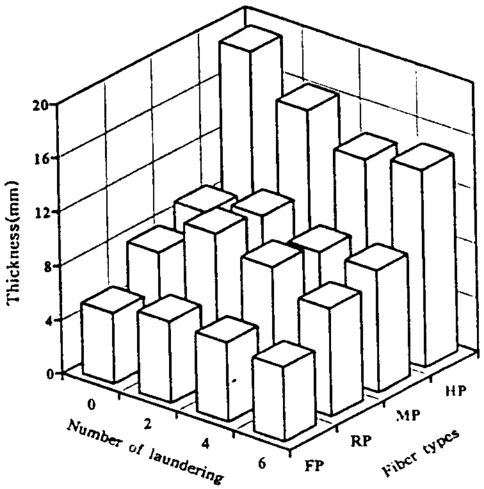

Fig. 1 . Effect of laundering on the thickness of spray bonding nonwovens.

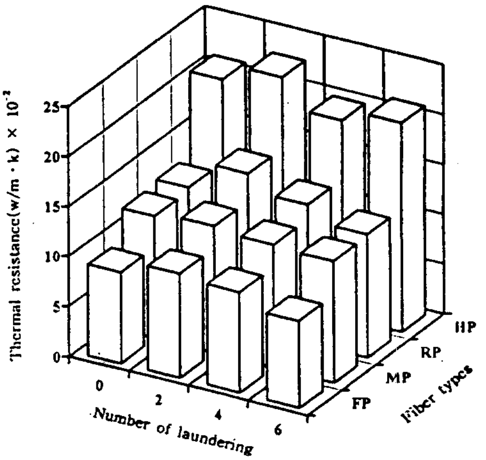

Fig. 2 . Effect of laundering on the thermal resistance of spray bonding nonwovens.

CONCLUSION

(1) Except the HP fibers, the SBN thickness of other type fibers was increased after second laundering.

(2) The thermal resistance of SBN was increased after second laundering due to the increasing of thickness and HP SBN had the highest thermal resistance.

REFERENCES

1. K.Slater, *Text. Prog.*, 8(3), 17(1976)
2. K.Slater, *Text. Prog.*, 9(4), 5(1977)