

## Compressional Behaviour of Spray-Bonded Nonwoven Fabrics

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### 1. INTRODUCTION

In a spray-bonded fabric system, small particles of adhesive bonding agent are applied to the fibrous layer in the form of a water dispersion. Since the characteristics of the fabric are with bulkiness, highloft, good warmth and porosity, the fabrics are usually used as apparel padding, insulation, quilting material and bedding.

In the chemical bonded fabrics, most of papers have been studied on the mechanical property(ref.1-3) and deformation behaviour(ref.4-6) for conventional saturation bonded fabrics and no paper have reported for the spray-bonded fabric.

Especially it is important to characterize the highloft property of the fabric in considering application of end-use. From the this fact, we have studied the compressional properties of the fabrics made with different fibers.

### 2. EXPERIMENTAL

The transverse orientated webs are made with the different polyester fibers and 48 types of the spray-bonded fabrics is prepared with fiber fineness, shape, blend ratio, fabric weight and washing condition.(KSK 0465) The fabrics are contained 8% acrylic binder concentration(o.w.f.) and cured for 3 min at 110-210°C.

The compressional properties such as LC(Linearity of Compression), WC(Compressional Energy), RC(Compressional Resilience), EMC(Compressional Rate) and compressional parameter(ref.7) are evaluated by using the KESF system.

### 3. RESULTS AND DISCUSSION

The compressional properties of 12 samples excluding laundering condition are presented in table 1. It is found that fabric density of Group A is increased with fabric weight and Group B, C, D is observed an opposite trend.

The compressional parameter(K) is analyzed to obtain the relationship between thickness and pressure. The K values are increased with blend ratio of hollow fiber and fabric weight, which is that the fabric is varied as a porous structure.

From the compressional data, we have found that hollow fiber and binder fiber contribute the fabric to be bulky and highlofty respectively, whereas, microfiber does the fabric to be dense and full.

Tensile strength of Group D is increased with fabric weight because binder fiber is melt and fused, however, owing to the insufficiency of internal penetration of acrylic binder, that of Group A, B and C is decreased.

Also compressional property and tensile strength are evaluated on the spray nonwovens after laundering.

Table 1. Compressional Data of the Different Spray-Bonded Nonwoven Fabrics.

SAMPLE*	FABRIC WEIGHT (GSM)	THICKNESS (mm)	DENSITY (g/cm <sup>3</sup> )	K	LC	WC (gf cm/cm <sup>2</sup> )	RC (%)	EMC (%)
A 1	52	3.06	0.0169	0.148	0.305	1.57	68.7	68.1
A 2	92	4.65	0.0198	0.176	0.241	2.49	64.2	81.1
A 3	112	5.31	0.0211	0.171	0.234	2.45	70.6	78.5
B 1	84	5.69	0.0148	0.181	0.290	3.42	64.8	83.1
B 2	102	7.94	0.0128	0.189	0.250	4.33	60.2	87.3
B 3	131	10.24	0.0127	0.197	0.240	5.10	58.2	90.6
C 1	56	7.06	0.0079	0.194	0.260	3.72	47.0	89.2
C 2	85	13.10	0.0065	0.201	0.261	10.50	40.5	92.5
C 3	108	19.19	0.0056	0.203	0.243	10.90	39.2	93.2
D 1	66	5.60	0.0118	0.184	0.309	4.13	56.1	84.5
D 2	80	6.68	0.0119	0.178	0.365	5.03	49.4	82.0
D 3	105	9.09	0.0116	0.191	0.261	5.21	55.2	88.0

\* Group A : 0.7De×38mm

Group B : 2.0De×51mm

Group C : 3.0De×51mm

Group D : (Fiber Blended N/W)

2.0De×51mm(70%)/ 3.0De×51mm(20%)/ 4.0De×51mm(10%:Binder Fiber)

#### 4. CONCLUSION

The compressional and tensile property of the spray-bonded fabrics are evaluated. From the study, we have found the facts as follows: (1)In preliminary study, heat treatments on the fabric surface allow spray-bonded fabrics to be dense and full and the compressional property is dependent on the fabric structure with fiber characteristics, (2)The binder can not be readily penetrated onto the microfiber web and its penetration is concerned with web thickness, (3)Blended binder fiber is a factor to increase the tensile strength of the fabric, (4)For the fabric before and after laundering, the compressional properties show a little difference except for RC and EMC and the tensile strength is generally decreased.

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