



(11) **EP 3 779 014 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
17.02.2021 Bulletin 2021/07

(51) Int Cl.:
D04H 1/55 ^(2012.01) **D04H 1/541** ^(2012.01)
D04H 1/559 ^(2012.01) **D06N 7/00** ^(2006.01)

(21) Application number: **19821953.7**

(86) International application number:
PCT/KR2019/007015

(22) Date of filing: **11.06.2019**

(87) International publication number:
WO 2019/245217 (26.12.2019 Gazette 2019/52)

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

- **LEE, Min-ho**
Seoul 07793 (KR)
- **CHO, Hee-jung**
Seoul 07793 (KR)
- **PARK, Young-shin**
Seoul 07793 (KR)
- **CHOI, Woo-seok**
Seoul 07793 (KR)

(30) Priority: **19.06.2018 KR 20180070113**

(74) Representative: **Ter Meer Steinmeister & Partner**
Patentanwälte mbB
Nymphenburger Straße 4
80335 München (DE)

(71) Applicant: **Kolon Industries, Inc.**
Seoul 07793 (KR)

(72) Inventors:
• **JANG, Jung-soon**
Seoul 07793 (KR)

(54) **NON-WOVEN FABRIC FOR CARPET BACKING AND METHOD FOR MANUFACTURING SAME**

(57) The present disclosure relates to a nonwoven fabric for primary carpet backing and a method for manufacturing same, the non-woven fabric having different colors on the two sides thereof and improved mechanical property. More specifically, the present disclosure relates to a non-woven fabric for primary carpet backing and a method for manufacturing same, wherein any one surface of the two surfaces of appears in a range of white

to grey and the opposite surface thereof appears in a range of dark grey to black, so that the separate manufacture of non-woven fabrics having various colors according to carpet colors is not required, which facilitates the inventory management of the non-woven fabric, achieves color matching between a carpet pile yarn and a nonwoven fabric for primary carpet backing, and improve the efficiency of the carpet manufacturing process.

EP 3 779 014 A1

Description**[TECHNICAL FIELD]****CROSS-REFERENCE TO RELATED APPLICATION(S)**

[0001] This application claims the benefit of Korean Patent Application No. 10-2018-0070113 filed on June 19, 2018 with the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference in its entirety.

[0002] The present disclosure relates to a method for manufacturing a nonwoven fabric for primary carpet backing, which has different colors on the two sides thereof and improved mechanical property.

[BACKGROUND ART]

[0003] Carpets form various colors and patterns and have a soft touch, and thus, are used not only for decorations showing aesthetic effects in hotels, offices, homes, automobiles, etc., but also for purposes such as comfortability, antifouling, and sound insulation.

[0004] Carpets are made of carpet fabrics through a tufting process (process of introducing a BCF carpet yarn to a non-woven fabric) and a back coating process that fixes a carpet yarn and imparts shape stability (process of coating an auxiliary solution such as PVC, PE, EVA or SBR in various layer configurations on the back surface of tufted nonwoven fabric, and then curing it).

[0005] In the manufacture of carpets, the primary carpet backing is an important factor that influences the quality of the carpet as a support for the resin layer, which plays the role of determining the aesthetic appearance quality of the carpet, and the role of walking comfortableness, sound insulation, and heat-retaining property of the product.

[0006] The physical and thermal external forces that the primary carpet backing receives in the entire carpet manufacturing process is high. In the tufting process, a hole is drilled and damaged by a needle, and in the back coating process, it receives thermal external force through heating and cooling processes in a state in which the resin material is attached.

[0007] Therefore, since the carpet primary backing directly affects the defects of the product, the carpet primary backing must maintain the arrangement shape of the carpet yarns even when it is physically damaged, and there must be no shape deformation in a thermal environment.

[0008] In addition, various colors of carpet yarns are applied in an attempt to differentiate from the existing carpet through improvement of aesthetic performance, and the primary backing visible between the carpet yarns also requires various colors according to the color of the carpet. Consequently, by adjusting the carbon black content of the polymer, products within a range from white to black are needed. Therefore, carpet manufacturers have problems that the primary backing should manage the inventory for each color depending on the carpet product.

[Prior Art Literature]

[Patent Literature]

[0009] (Patent Literature 1) Korean Patent Registration No. 1778177 entitled "Manufacturing method of nonwoven fabric having different colors on both sides"

[DETAILED DESCRIPTION OF THE INVENTION]**[Technical Problem]**

[0010] An object of the present disclosure is to provide a nonwoven fabric for primary carpet backing which is configured to have different colors on the two sides of the nonwoven fabric by spinning filaments having different carbon black content, and has excellent mechanical properties after tufting by bicomponent-spinning a low-melting-point copolyester.

[0011] Another object of the present disclosure is to provide a method for manufacturing a nonwoven fabric for primary carpet backing which is configured to have different colors on the two sides of the nonwoven fabric by spinning filaments having different carbon black content, and has excellent mechanical properties after tufting by bicomponent-spinning a low-melting-point copolyester.

[Technical Solution]

[0012] There is provided a nonwoven fabric for primary carpet backing, comprising: a first surface layer and a second

surface layer, wherein the first surface layer and the second surface layer comprises a mixed filament yarn having a content ratio of a first filament including a first polyester having a melting point of 250°C or more and a carbon black, and a second filament including a second polyester having a melting point of 190°C or less of 95:5 to 85:15%, and wherein the total content of the carbon black in the first surface layer is 0.06 to 0.15% by weight, and the total content of the carbon black in the second surface layer is 0.3 to 0.5% by weight.

[0013] There is also provided a method for manufacturing a nonwoven fabric for primary carpet backing, the method comprising the steps of: melting a first polyester having a melting point of 250°C or more containing 0.07 to 0.15% by weight of a carbon black for the first filament, and a second polyester having a melting point of 190°C or less for the second filament, respectively, discharging the molten polyester through a spinning nozzle, and bicomponent-spinning so that a content ratio of the first filament to the second filament is 95:5 to 85:15% by weight, thereby preparing a mixed filament yarn for web of the first row; melting a first polyester having a melting point of 250°C or more containing 0.37 to 0.5% by weight of carbon black for the first filament and a second polyester having a melting point of 190°C or less for the second filament, respectively, discharging the molten polyester through a spinning nozzle, and bicomponent-spinning so that a content ratio of the first filament to the second filament is 95:5 to 85:15% by weight, thereby preparing a mixed filament yarn for web of the second row; laminating the mixed filament yarns for web of the first row to form a web of the first row, and laminating a web of the second row with the mixed filament yarn for web of the second row thereon to form a web in which the first row and the second row are laminated; and subjecting the laminated web to a calendering process using a smooth roll and then thermally bonding the web with hot air to manufacture the nonwoven fabric, wherein the web of the first row contains 0.06 to 0.15% by weight of the carbon black, and the web of the second row contains 0.3 to 0.5% by weight of the carbon black.

[ADVANTAGEOUS EFFECTS]

[0014] According to the present disclosure, any one surface of the two surfaces of the nonwoven fabric appears in a range from white to gray and the opposite surface thereof appears in a range from dark gray to black, that is, it appears a relatively bright color on one surface and a dark color on the opposite surface, thereby providing a nonwoven fabric for primary carpet backing having a difference in colors of the two surfaces, and a method of manufacturing the same.

[0015] Specifically, a nonwoven fabric for primary carpet backing and a method of manufacturing the same can be provided in which any one surface of the two surfaces of the nonwoven fabric is selectively easily used in compliance with dark or light color of the carpet pile yarn, so that the separate manufacture of non-woven fabrics having various colors according to carpet colors is not required, which facilitates the inventory management of the non-woven fabric, achieves color matching between a carpet pile yarn and a nonwoven fabric for primary carpet backing, and improve the efficiency of the carpet manufacturing process.

[0016] Further, even when an external force (physical or thermal) is applied in the carpet manufacturing process, shape deformation is small, and thus, it is possible to provide a nonwoven fabric for primary carpet backing having excellent mechanical properties and a method for manufacturing the same.

[0017] In addition, by increasing the autonomous mobility of the filament through adjustment of the content of the low-melting-point copolyester, it is possible to provide a nonwoven fabric for primary carpet backing that reduces damage to filaments during tufting and prevents a reduction in strength of the nonwoven fabric or carpet, and a method for manufacturing the same.

[DETAILED DESCRIPTION OF THE EMBODIMENTS]

[0018] Hereinafter, a nonwoven fabric for primary carpet backing and a method of manufacturing the same according to a specific embodiment of the present disclosure will be described in more detail.

[0019] Terms such as first or second may be used to describe various components, and such components are used only to distinguish one component from another.

[0020] According to the present disclosure, in the two types of filaments constituting the nonwoven fabric, the first filament is formed of a polyester thermoplastic resin having a melting point of 250°C or more, or 255°C or more, and the second filament is formed of a copolyester thermoplastic resin having a melting point of 190°C or less, or 185°C or less, or 180°C or less. In particular, by incorporating carbon black in the first filament, the color is adjusted in the nonwoven fabric.

[0021] The first polyester, which is the first filament component, is a general polyester having an intrinsic melting point of the resin without changing the melting point. If the melting point is 250°C or more, those for fibers manufactured by conventional manufacturing methods can be used without limitation, and for example, polyethylene terephthalate, polybutylene terephthalate, polynaphthalene terephthalate, and the like may be used.

[0022] When a tensile force is applied under a high temperature environment at the time of processing the nonwoven fabric and molding the carpet, the first polyester, which is the first filament component in the nonwoven fabric, plays a

role in maintaining the shape of the desired manufacturing width by moderately stretching at a ratio similar to that of the back coating material, while having low heat shrinkage.

[0023] Meanwhile, the second polyester, which is the second filament component, may be a low-melting-point polyester having a melting point of 190°C or less, for example, a polyester copolymerized with adipic acid, or a polyester copolymerized with isophthalic acid, or polyester copolymerized with adipic acid and isophthalic acid.

[0024] Further, the low-melting-point polyester is preferably a copolymer in which an additive such as adipic acid or isophthalic acid is mixed with the same type of polyester as the general polyester in the polymerization process, and the melting point is adjusted to 190°C or less. The low-melting-point polyester is melted in the thermal bonding step, and in the process of adhering general polyester fibers to each other, it can be easily bonded with general polyester, which is the same material, and therefore, it is effective in improving the adhesive strength, and improving the strength of the nonwoven fabric and reducing the shrinkage rate.

[0025] At this time, if the melting point of the second polyester exceeds 190°C, the hot elongation of the nonwoven fabric decreases when molding at a general molding temperature, for example, 180°C or less, which may lead to problems of molding defects such as yarn rows, bursts, and wrinkles.

[0026] Meanwhile, the filament spinning is performed by dividing into a first row and a second row, and carbon black may be incorporated in the first filament to adjust the color of the nonwoven fabric.

[0027] At this time, by differently adjusting the carbon black content of the first filaments constituting the first row and the second row, a nonwoven web having different colors on the two sides thereof is formed due to a color difference between the web of the first row and the web of the second row.

[0028] Hereinafter, a method of manufacturing a nonwoven fabric for primary carpet backing having different colors on the two sides thereof and improved mechanical properties according to the present disclosure will be described.

[0029] A step of preparing a mixed filament yarn for web of the first row can be performed by melting a first polyester having a melting point of 250°C or more containing 0.06 to 0.15% by weight, or 0.07 to 0.15% by weight of carbon black for the first filament and a second polyester having a melting point of 190°C or less for the second filament, respectively, discharging the molten polyester through a spinning nozzle, and bicomponent-spinning so that a content ratio of the first filament to the second filament is 95:5 to 85:15% by weight, or 94:6 to 86:14% by weight.

[0030] At this time, as the content of carbon black in the first filament increases, the color of the nonwoven web becomes darker from white to black.

[0031] Meanwhile, as the content of carbon black in the first filament decreases from less than 0.07% by weight, the color of the nonwoven web changes to white.

[0032] In the present disclosure, the second filament is made of polyester having a melting point of 190°C or less, and is softened or melted by hot air in a thermal bonding process described later, thereby bonding the surrounding filaments and thus imparting strength and rigidity in the nonwoven fabric.

[0033] Meanwhile, in the mixed filament yarn for web of the first row, the content ratio of the first filament to the second filament may be 95:5 to 85:15% by weight, or 94:6 to 86:14% by weight. At this time, when the content ratio of the second filament is less than 5% by weight, the part of the nonwoven web that are not bonded between filaments due to hot air is increased, and thus, the shape of the nonwoven fabric is not formed. A uniform deformation is not achieved in the molding process after manufacture of the carpet, and thus, problems such as tearing may occur.

[0034] When the content ratio of the second filament exceeds 15% by weight, the adhesive component content of the nonwoven fabric is excessive, so the nonwoven fabric becomes less elastic (brittle), and the damage to the filament during tufting may be increased, and the mechanical properties of the primary backing after tufting may be rapidly decreased.

[0035] Meanwhile, a step of preparing a mixed filament yarn for web of the second row can be performed by melting a first polyester having a melting point of 250°C or more containing carbon 0.3 to 0.5% by weight, or 0.37 to 0.5% by weight of black for the first filament and a second polyester having a melting point of 190°C or less for the second filament, respectively, discharging the molten polyester through a spinning nozzle, and bicomponent-spinning so that a content ratio of the first filament to the second filament is 95:5 to 85:15% by weight, or 94:6 to 86:14% by weight.

[0036] At this time, if the content of carbon black in the first filament exceeds 0.5% by weight, carbon black acts as a foreign substance and interferes with the formation of filaments, which can cause problems such as yarn breakage, whereby spinning may not be possible. In particular, in order to express a difference in color between the web of the first row and the web of the second row, there should be a difference in the content of carbon black contained in each row.

[0037] Meanwhile, in the mixed filament yarn for web of the second row, the content ratio of the first filament to the second filament may be 95:5 to 85:15% by weight, or 94:6 to 86:14% by weight. At this time, when the content ratio of the second filament is less than 5% by weight, the part of the nonwoven web that are not bonded between filaments due to hot air is increased, and thus, the shape of the nonwoven fabric is not properly formed. And, a uniform deformation is not achieved in the molding process after manufacture of the carpet, and thus, problems such as tearing may occur. When the content ratio of the second filament exceeds 15% by weight, the adhesive component content of the nonwoven fabric is excessive, so the nonwoven fabric becomes less elastic (brittle), and the damage to the filament during tufting

may be increased, and the mechanical properties of the primary backing after tufting may be rapidly decreased.

[0038] The filament spun in the form of mixed filament yarn according to the present disclosure can be sufficiently drawn so that the spinning speed is 4,500 to 5,500 m/min using a high-pressure air drawing device, so that a filament having a fineness of usually 4 to 10 denier can be produced.

[0039] Subsequently, a step of forming a web composed of a first surface layer and a second surface layer can be performed by laminating the mixed filament yarns for web of the first row in the form of a web on a conveyor net to form a web of the first row, and laminating a web of the second row with the mixed filament yarns for web of the second row thereon, so that the first row and the second row are laminated.

[0040] Subsequently, a step of manufacturing the nonwoven fabric can be performed by subjecting the laminated web to a calendering process using a smooth roll and then thermally bonding the web with hot air.

[0041] Meanwhile, as described above, in the nonwoven fabric for primary carpet backing, any one surface of the two surfaces may appear in a range of white to gray, and the opposite surface may appear in a range of dark gray to black.

[0042] As an example, for a specimen having a minimum diameter of 40 mm or more, the value of the white index (WI) measured using the X-rite's Color-Eye 7000A device may be 5.3 to 17.0, or 5.5 to 16.5 for the first surface layer, and may be 4.0 to 5.2, or 4.2 to 5.2 for the second surface layer.

[0043] In other words, relatively one surface can appear a light color and the opposite surface thereof can appear a dark color, and thus, it is possible to provide a nonwoven fabric for primary carpet backing having different colors on the two sides thereof.

[0044] Further, in the nonwoven fabric for primary carpet backing, when tufting is performed to manufacture a carpet, a reduction rate of the tensile strength before and after tufting may be 70% or less, or 68% or less.

[0045] At this time, the tensile strength can be measured after clamping a specimen having a size of width $\times$ length = 5 $\times$ 20 cm with a zig with a size of top/bottom 5 $\times$ 5 cm using the method of KS K 0521 as in the Experimental Example described later, and then measuring at a tensile speed of 200 mm/min.

[0046] If the reduction rate of the tensile strength before and after tufting is 70% or less, the shape stability is excellent, so it can fix BCF yarn and prevent damage and shape deformation of the nonwoven fabric due to tension between coating processes.

[0047] As described above, according to the present disclosure, by producing a mixed filament yarn of filaments having different melting points and containing carbon black and filaments that do not contain it, and a web laminating of two-layered structure having different carbon black content, the manufacture of the nonwoven fabric is carried out in a continuous process from spinning. And, by adjusting the content of the low-melting-point copolyester even while the colors of the two surfaces of the non-woven fabric are different, it is possible to provide a nonwoven fabric in which mechanical properties are not impaired by the tufting process.

[0048] Hereinafter, the present disclosure will be described in more detail with reference to the following examples and comparative examples.

[0049] However, the following examples are for illustrative purposes only, and the present disclosure is not limited thereby. It will be apparent to those of ordinary skill in the art that substitutions and other equivalent modifications can be made to the invention without departing from the technical spirit of the present disclosure.

[Example 1]

[0050] An extruded melt of polyethylene terephthalate having a melting point of 255°C which was obtained by side-feeding carbon black so that the content of carbon black was 0.07wt% to form the first filament, and an extruded melt of polyethylene terephthalate having a melting point of 180°C which was obtained by copolymerizing adipic acid and isophthalic acid to form a second filament, were respectively discharged through a spinning nozzle at the bottom of the continuous extruder, and bicomponent-spun to produce a mixed filament yarn for web of the first row.

[0051] An extruded melt of polyester having a melting point of 255°C which is obtained by side-feeding carbon black so that the content of carbon black was 0.5wt% to form the first filament, and an extruded melt of polyester having a melting point of 180°C which was obtained by copolymerizing adipic acid and isophthalic acid to form a second filament, were respectively discharged through a spinning nozzle at the bottom of the continuous extruder, and bicomponent-spun to produce a mixed filament yarn for web of the second row.

[0052] At this time, the bicomponent spinning was made such that the content ratio of the first filament and the second filament was 90:10 wt%, and the discharge amount and the number of spinning nozzles were adjusted so that the fineness of the mixed filament produced by drawing was 8 denier.

[0053] Further, the continuous filaments discharged from the spinning nozzle were solidified with a cooling air, and then drawn so that the spinning speed was 5,000 m/min using a high-pressure air drawing device.

[0054] Subsequently, the mixed filament yarn for web of the first row was laminated on a conveyor net by a conventional opening method to form a web of the first row such that the content of the carbon black of the first row was 0.063 wt%, and a web of the second row was laminated with the mixed filament yarn for web of the second row thereon so that the

content of carbon black of the second row was 0.45wt%, to thereby form a web in which the first surface layer by the first row and the second surface layer by the second row were laminated.

[0055] The web thus laminated was subjected to a calendering process using a heated smooth roll to impart smoothness and appropriate thickness, and thermally bonded through hot air. Thereby, a nonwoven fabric for primary carpet backing having a weight per unit area of 120 g/m² was prepared by thermal bonding through hot air.

[Examples 2 to 4] and [Comparative Examples 1 to 4]

[0056] The nonwoven fabrics for primary carpet backing were manufactured in the same manner as in Example 1, except that in Example 1, the bicomponent-spinning ratio of the mixed filament yarn and the carbon black content in the first row and the second row are as shown in Table 1 below.

[Table 1]

Category	Content of first filament (wt%)	Content of second filament (wt%)	Content of carbon black of first row (wt%)		Content of carbon black of second row (wt%)	
			First filament	First laminated web	First filament	Second laminated web
Example 1	90	10	0.07	0.063	0.5	0.45
Example 2	90	10	0.15	0.135	0.37	0.333
Example 3	86	14	0.15	0.129	0.37	0.318
Example 4	94	6	0.15	0.141	0.37	0.347
Comparative Example 1	90	10	0.05	0.045	0.5	0.45
Comparative Example 2	90	10	0.07	0.063	0.6	0.54
Comparative Example 3	96	4	0.07	0.067	0.5	0.48
Comparative Example 4	80	20	0.07	0.056	0.4	0.4

[0057] The properties of the spunbond nonwoven fabric for primary carpet backing and the nonwoven fabric after tufting in the Examples and Comparative Examples were measured according to the following test method, and the results are shown in Table 2 below.

[0058] At this time, the tufting was performed under the conditions of a gauge (10 ea/inch) and a BCF yarn height (3mm) in a loop form.

<Testing Method>

1. Tensile strength (unit: Kg.f/5cm) and tensile elongation (%)

[0059] The method of KS K 0521 was used.

[0060] A specimen having a size of width × length = 5 × 20 cm is clamped with a jig with a size of top/bottom 5 x 5 cm using Instron's testing equipment, and then measured at a tensile speed of 200 mm/min.

2. White Index (WI)

[0061] Measured using X-rite's Color-Eye 7000A device.

[0062] For the evaluation specimen, a minimum diameter of 40 mm or more was used, and the average value was shown after measuring three times for each sample.

[0063] As the numeral value of the measured value WI is higher, it means white.

[Table 2]

Category	Tensile strength MD/CD (Kg.f/5cm)		Reduction rate of tensile strength after tufting MD/CD (%)	Tensile elongatio n MD/CD (%)	White Index (first surface layer/sec ond surface layer)	Final color (first surface layer/sec ond surface layer)	Remark
	Before tufting	After tufting					
Example 1	27.2/28.4	11.4/13.1	58/54	56.6/58.1	16.4/4.2	Light gray/ blac k	
Example 2	26.8/27.3	10.5/10.4	61/62	57.1/57.8	5.7/5.1	Gray/dar k gray	
Example 3	29.5/30.1	9.4/10.2	68/66	51.3/52.8	5.8/5.2	Gray/dar k gray	
Example 4	26.2/26.7	11.5/12.8	56/52	59.4/60.2	5.5/4.9	Gray/dar k gray	
Compara tive Example 1	27.6/28.4	13.2/13.1	52/54	57.4/58.3	18.3/4.4	White/bla ck	
Compara tive Example 2	-	-	-	-	-	-	Defective spinning
Compara tive Example 3	17.5/19.5	8.6/9.9	51/49	56.9/58.2	16.4/4.3	Light gray/ blac k	Strength failure
Compara tive Example 4	31.4/33.1	9.1/8.3	71/75	38.6/39.7	16.5/4.3	Light gray/ blac k	Tufting failure

[0064] From the results of Table 2, it is confirmed that in the nonwoven fabric for primary carpet backing according to the present disclosure, the first surface layer appears in a range of white to gray, the second surface layer appears in a dark gray to black range, and the first and second surface layers show different colors of relatively light and dark colors which are clearly contrasting, and thus, it is possible to select and use a surface appearing light or dark color in compliance with the final color of the carpet.

[0065] On the other hand, when the content of the second filament in the mixed filament yarn decreases (see Comparative Example 3), the tensile strength of the nonwoven fabric is lowered, and when the content of the second filament is increased (see Comparative Example 4), the reduction rate of tensile strength after tufting is increased, so that the physical properties after tufting are deteriorated.

[0066] In addition, when the content of carbon black in the first filament is increased (see Comparative Example 2), it is confirmed that yarn breakage and clogging of the spinning nozzle occur and spinning is not performed properly, and thus, the nonwoven web is not formed.

Claims

1. A nonwoven fabric for primary carpet backing, comprising: a first surface layer and a second surface layer, wherein the first surface layer and the second surface layer comprises a mixed filament yarn having a content ratio of a first filament including a first polyester having a melting point of 250°C or more and a carbon black, and a second filament including a second polyester having a melting point of 190°C or less of 95:5 to 85:15%, and wherein the total content of the carbon black in the first surface layer is 0.06 to 0.15% by weight, and the total content

of the carbon black in the second surface layer is 0.3 to 0.5% by weight.

2. The nonwoven fabric for primary carpet backing according to claim 1, wherein the first filament constituting the first surface layer contains 0.07 to 0.15% by weight of the carbon black, and the first filament constituting the second surface layer contains 0.37 to 0.5% by weight of the carbon black.

3. The nonwoven fabric for primary carpet backing according to claim 1, wherein a white index is 5.3 to 17.0 for the first surface layer, and 4.0 to 5.2 for the second surface layer.

4. The nonwoven fabric for primary carpet backing according to claim 1, wherein in the case of tufting to manufacture a carpet, a reduction rate of tensile strength before and after tufting is 70% or less.

5. A method for manufacturing a nonwoven fabric for primary carpet backing, the method comprising the steps of:

melting a first polyester having a melting point of 250°C or more containing carbon black for the first filament and a second polyester having a melting point of 190°C or less for the second filament, respectively, discharging the molten polyester through a spinning nozzle, and bicomponent-spinning so that a content ratio of the first filament to the second filament is 95:5 to 85:15% by weight, thereby preparing a mixed filament yarn for web of the first row;

melting a first polyester having a melting point of 250°C or more containing carbon black for the first filament and a second polyester having a melting point of 190°C or less for the second filament, respectively, discharging the molten polyester through a spinning nozzle, and bicomponent-spinning so that a content ratio of the first filament to the second filament is 95:5 to 85:15% by weight, thereby preparing a mixed filament yarn for web of the second row;

laminating the mixed filament yarns for web of the first row to form a web of the first row, and laminating a web of the second row with the mixed filament yarn for web of the second row thereon to form a web in which the first row and the second row are laminated; and

subjecting the laminated web to calendering process using a smooth roll, and then thermally bonding the web with hot air to manufacture the nonwoven fabric, wherein the web of the first row contains 0.06 to 0.15% by weight of the carbon black, and the web of the second row contains 0.3 to 0.5% by weight of the carbon black.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2019/007015

A. CLASSIFICATION OF SUBJECT MATTER

D04H 1/55(2012.01)i, D04H 1/541(2012.01)i, D04H 1/559(2012.01)i, D06N 7/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D04H 1/55; D04H 3/009; D04H 3/011; D04H 3/11; D04H 3/147; D06N 3/14; D06P 5/17; D04H 1/541; D04H 1/559; D06N 7/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS (KIPO internal) & Keywords: felt, polyester, filament, carbon black, color

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-1802130 B1 (KOLON INDUSTRIES, INC.) 29 November 2017 See paragraphs [0033], [0041], [0048]; and claims 1, 3-6.	1-5
Y	KR 10-2004-0029264 A (KURARAY CO., LTD.) 06 April 2004 See claims 1-2.	1-5
Y	KR 10-2005-0084795 A (TORAY INDUSTRIES, INC.) 29 August 2005 See pages 11-12.	1-5
Y	KR 10-0386744 B1 (TORAY INDUSTRIES, INC.) 21 August 2003 See claims 1-9.	1-5
Y	KR 10-2002-0029670 A (CARL FREUDENBERG KG.) 19 April 2002 See claims 1-12.	1-5

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

27 SEPTEMBER 2019 (27.09.2019)

Date of mailing of the international search report

01 OCTOBER 2019 (01.10.2019)

Name and mailing address of the ISA/KR

 Korean Intellectual Property Office
Government Complex Daejeon Building 4, 189, Cheongsu-ro, Seo-gu,
Daejeon, 35208, Republic of Korea
Facsimile No. +82-42-481-8578

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2019/007015

Patent document cited in search report	Publication date	Patent family member	Publication date
KR 10-1802130 B1	29/11/2017	KR 10-2013-0077952 A	10/07/2013
KR 10-2004-0029264 A	06/04/2004	CN 1497098 A	19/05/2004
		EP 1403421 A2	31/03/2004
		EP 1403421 A3	21/12/2005
		EP 1403421 B1	07/02/2007
		JP 2004-143654 A	20/05/2004
		JP 4233965 B2	04/03/2009
		US 2004-0063366 A1	01/04/2004
		US 7951452 B2	31/05/2011
KR 10-2005-0084795 A	29/08/2005	EP 1553225 A1	13/07/2005
		EP 1553225 B1	27/04/2011
		US 2006-0035556 A1	16/02/2006
		WO 2004-015194 A1	19/02/2004
KR 10-0386744 B1	21/08/2003	EP 0831161 A1	25/03/1998
		EP 0831161 B1	18/05/2005
		US 6485811 B1	26/11/2002
		WO 97-37071 A1	09/10/1997
KR 10-2002-0029670 A	19/04/2002	CN 1365405 A	21/08/2002
		EP 1198631 A1	24/04/2002
		EP 1198631 B1	08/09/2004
		JP 2003-505616 A	12/02/2003
		JP 3682432 B2	10/08/2005
		US 6815382 B1	09/11/2004
		WO 01-07698 A1	01/02/2001

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- KR 1020180070113 [0001]
- KR 1778177 [0009]