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(54) NONWOVEN FABRIC HAVING ENHANCED PULL-OUT STRENGTH FOR CARPET BACKING FABRIC AND MANUFACTURING METHOD THEREFOR

(57) The present disclosure relates to a nonwoven fabric having enhanced withdrawal force for a carpet backing fabric, which is composed of a nonwoven fabric comprising 50 to 90% by weight of polyester filaments having a melting point of 250°C or higher and 10 to 50% by weight of low-melting point copolyester filaments having a melting point of 200°C or lower. According to the present disclosure, a nonwoven fabric comprising low-melting point polyester fibers is used as a backing fabric and the thickness of the backing fabric is controlled, so that the withdrawal force of carpets is enhanced, thereby suppressing the falling out of BCF yarns from the carpet.

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Description

[Technical Field]

[0001] The present disclosure relates to a nonwoven fabric for carpet backing fabric for suppressing the falling out of bulked continuous filament (BCF) yarns that are implanted into a backing fabric when manufacturing a carpet, and a production method thereof.

[Background Art]

[0002] Carpets are used not only for decoration in hotels, offices, homes, automobiles, and the like, but also for purposes of providing comfort and sound insulation.

[0003] In the manufacture of the carpet, it is manufactured into a carpet fabric through a tufting process of implanting carpet yarns into a nonwoven fabric, and a back coating process of coating materials such as PVC, PE, EVA or SBR onto the back surface of the tufted nonwoven fabric and curing them.

[0004] When the carpet fabric is cut into squares (for example, 50 cm X 50 cm), it becomes a tile carpet used in hotels, offices, homes, etc. When the fabric is molded into the shape of a car floor, it becomes a car floor mat.

[0005] The nonwoven fabric for carpet backing fabric is an important factor that determines shape stability as a support of a resin layer which plays a role of sound insulation and heat insulation of the product while fixing the carpet yarns that determine the aesthetic appearance quality of the carpet.

[0006] In the tufting process, the carpet yarn penetrates the backing fabric. At this time, the carpet yarns are primarily fixed to the backing fabric by frictional force with the filaments constituting the backing fabric.

[0007] At this time, the backing fabric must maintain the arrangement shape of carpet yarns despite physical damage that generates a minimum of 160,000 holes/m^2 due to the needle, and the shape must not be deformed by the drying and cooling during the back coating process.

[0008] In addition, if the backing fabric shows a very stiff or dense configuration, the resistance to the up/down movement of the needle is increased, so that the impact and noise received by the tufting machine are severe, and the strength reduction increases due to damage on the filaments constituting the nonwoven fabric.

[0009] For intermediate products that have undergone the tufting process, the implanted carpet yarns are fallen out in the storage and transportation process or damage may occur in the tufted fabric, and thus, excellent mending properties are required. At this time, when carpet yarns falls out the hole after the tufting process, the mending includes repairing this.

[0010] However, for the finished carpet product, the mending is difficult and thus, it is important to prevent the carpet yarns from falling out from the intermediate product.

[DETAILED DESCRIPTION OF THE PRESENT DISCLOSURE]

[Technical Problem]

[0011] In order to meet the needs as described above, an object of the present disclosure is to provide a nonwoven fabric for a carpet backing fabric having an improved fixing capability of BCF yarns in the carpet, and a method for producing the same.

[Technical Solution]

[0012] In order to achieve the above object, in one aspect of the present disclosure, there is provided a nonwoven fabric having enhanced withdrawal force (pull-out strength) for a carpet backing fabric, which includes 50 to 90% by weight of polyester first filaments having a melting point of 250°C or higher and 10 to 50% by weight of low-melting point copolyester second filaments having a melting point of 200°C or lower, wherein loop withdrawal force of carpets is 2.0 to 3.0 kgf (Method KS K ISO 4919).

[0013] In another aspect of the present disclosure, there is provided a method for producing a nonwoven fabric having enhanced withdrawal force for a carpet backing fabric, including: a blend-spinning step of spinning and blending a first filament made of a polyester having a melting point of 250°C or higher and a second filament made of a low melting point copolyester having a melting point of 200°C or lower; a step of blend-spinning and laminating the first filament to have a content of 50 to 90% by weight and the second filament to have a content of 10 to 50% by weight to form a web; a step of subjecting the web to a calendering process using smooth rolls to produce a nonwoven fabric; and a step of tufting the nonwoven fabric and treating the fabric with a coating material to manufacture a carpet.

[ADVANTAGEOUS EFFECTS]

[0014] According to the present disclosure, a nonwoven fabric including low-melting point polyester fibers is used as a backing fabric, and the melting point and content of the low-melting copolyester in the nonwoven fabric and the thickness of the backing fabric are controlled, so that the withdrawal force of carpets is enhanced, thereby suppressing the falling out of BCF yarns from the carpet.

[DETAILED DESCRIPTION OF THE EMBODIMENTS]

[0015] The nonwoven fabric for a carpet backing fabric of the present disclosure may include 50 to 90% by weight of polyester filaments having a melting point of 250°C or higher and 10 to 50% by weight of low-melting point copolyester filaments having a melting point of 200°C or lower.

[0016] The method for producing a nonwoven fabric for a carpet backing fabric includes a blend-spinning step of spinning a polyester having a melting point of 250°C or higher to obtain a first filament and spinning a copolyester having a melting point of 200°C or lower to obtain a second filament, wherein the first filament and the second filament are blended in the spinning process.

[0017] The first filament may be produced to have a fineness of 4 to 10 denier by a method in which the polyester having a melting point of 250°C or higher is supplied to an extruder and melted, then extruded through orifices of a spinneret, solidified with cooling air, and drawn using a high-pressure air drawing apparatus so that a spinning speed becomes 4,000 to 6,000 m/min.

[0018] The second filament may be produced in the same manner as in the method for producing the first filament, except for having a fineness of 1 to 5 denier.

[0019] In the present disclosure, if the fineness of the first filament is less than 4 denier, damage on the filament may occur during tufting, and thus, the ability of the nonwoven fabric to fix BCF yarns may be reduced. In addition, the density of the backing fabric is excessively increased, which makes it difficult to penetrate the PVC solution, thereby lowering the withdrawal force. On the other hand, if the fineness exceeds 10 denier, as the pore size increases in the nonwoven fabric, the penetration of the PVC solution is facilitated, but the sliding of BCF yarns is increased and the fixing capability is reduced, making it difficult to improve the withdrawal force.

[0020] In the present disclosure, when the fineness of the second filament is less than 1 denier, cutting of the filaments occurs and the strength of the backing fabric is weakened. When the fineness exceeds 5 denier, cooling problems may occur in the blend-spinning step, the spinnability is deteriorated, which may result in a deterioration of quality in the nonwoven fabric.

[0021] Thereafter, the bled-spun first filament and second filament are laminated on a conveyor net to form a web. The web may be adjusted to a weight per unit area of 70 to 110 g/m^2 according to the speed of the conveyor.

[0022] Since the second filament has a melting point equal to or lower than the drying temperature of the carpet manufacturing process, it can be melted in the carpet manufacturing process to more firmly fix the tufted BCF yarn.

[0023] At this time, preferably, in the nonwoven fabric of the present disclosure, the first filament may have a content of 50 to 90% by weight, and the second filament may have a content of 10 to 50% by weight.

[0024] If the content of the second filament is less than 10% by weight, the bonding force between the first filaments is lowered, the strength of the backing fabric is insufficient and the withdrawal force of carpets is insignificant. If the content exceeds 50% by weight, the cooling of the second filament is not sufficient in the blend-spinning step, opening defects between filaments occur, which causes quality problems such as poor appearance on the nonwoven fabric (defects, filament aggregation, surface roughness, etc.), which degrades the quality of the product.

[0025] In addition, since the aggregation site due to the opening defects causes breakage of the texture of the backing fabric when tufting, the falling out of BCF yarns occurs on the carpet, and the withdrawal force of carpets can be reduced.

[0026] Thereafter, the web can be subjected to a calendering process using a heated smooth roll and a heat bonding process to produce a nonwoven fabric in which the smoothness and the thickness are adjusted together with the adhesion between filaments.

[0027] In the heat bonding process, the second filament of the nonwoven web is melted and bonded by a hot air through method using a heated air stream. At this time, the second filament may be bonded between the first filaments due to the temperature higher than the melting point of the second filament.

[0028] In particular, by using a low melting point copolyester having a melting point of 200°C or lower as a raw material of the second filament, thermal damage to the first filament is reduced as the heat bonding temperature is lowered, and at the same time, high elongation is expressed in a high temperature atmosphere, thereby obtaining the effect of improving moldability.

[0029] In this case, the thickness of the nonwoven fabric is preferably in the range of 0.33 to 0.46 mm based on the weight per unit area of 70 to 110 g/m^2. If the thickness is less than the above range, the density of the nonwoven fabric becomes high, which makes it difficult to penetrate the coating solution, thereby lowering the withdrawal force of carpets.

If the thickness exceeds the above range, peeling occurs due to layer separation of the web, which makes it difficult to produce the nonwoven fabric which is completed as one layer, and at the same time does not exhibit sufficient strength.

[0030] As described above, the thickness of the present disclosure affects density and tufting performance by the thermal adhesive function of the second filament in the nonwoven fabric including the first filament and the second filament. Also, depending on the density of the non-woven fabric, the coating solution can penetrate to and bond with the non-woven fabric to affect the ability to be fixed. This reduces the density as the thickness of the nonwoven increases, thereby increasing the permeability of the coating solution and improving the fixing capability of BCF yarns.

[0031] Hereinafter, the present disclosure will be described in more detail by way the following Examples and Comparative Examples.

[0032] However, these examples are for illustrative purposes only and the present disclosure is not limited thereto. It will be apparent to those of ordinary skill in the art that various substitutions and modifications can be made without departing from the scope and spirit of the invention.

<Example 1>

[0033] Polyethylene terephthalate (PET) for fibers having a melting point of 255°C as a first filament and a low melting point copolyester copolymer (Co-PET) having a melting point of 180°C as a second filament were melted in each extruder, and the melt was extruded through orifices of a spinneret. The extruded polyester was solidified using a cooling air, and then blend-spun while drawing using a drawing apparatus so that a spinning speed became 5,000 m/min. At this time, the extruding amount and the orifice number of spinnerets were adjusted so that the fineness of the first filament was 8 denier and the fineness of the second filament was 3 denier.

[0034] At this time, the filaments were blend-spun so that the content of the first filament was 80% by weight and the content of the second filament was 20% by weight, and laminated in the form of a web on the conveyor net. The moving speed of the conveyor net was adjusted so that the weight per unit area was 90 g/m^2.

[0035] Thereafter, calendering was performed by passing through the heated calender roll, and a heat bonding process of applying hot air at 185°C was performed to produce a nonwoven fabric having a thickness of 0.36 mm while having a smoothness.

[0036] The produced nonwoven fabric was tufted to have a single level loop having a pile height of 3 mm.

[0037] The tufted nonwoven fabric was then coated by passing it together with a PVC solution of viscosity 24,000 cP through a Mangle roll under pressure of 1 kgf/cm^2.

[0038] Thereafter, the coated nonwoven fabric was dried at a drying temperature of 180°C to manufacture a carpet.

<Examples 2-6>

[0039] A carpet was manufactured in the same manner as in Example 1, except that the carpet was manufactured under the conditions of Table 1 below in Example 1.

<Comparative Example 1-5>

[0040] A carpet was manufactured in the same manner as in Example 1, except that the carpet was manufactured under the conditions of Table 1 below in Example 1.

[0041] The withdrawal forces of the carpets manufactured in Examples and Comparative Examples were measured by the following method and the results are shown in Table 1 below.

<Measurement Test of Withdrawal Force>

[0042] It is measured according to the standard KS K ISO 4919 (Carpet-Determination of Tuft Withdrawal Force).

[0043] One loop to be tested from the tufted sample was clamped to a measuring device. The loop to be tested and two adjacent loops were cut.

[0044] Using an Instron testing machine, the peak value appearing when the loop to be tested was pulled perpendicular to the sample was taken. This was repeated five times to take an average value. Three samples were prepared and the evaluation was repeated.

[Table 1]

Category	Melting point of first filament (°C)	Content of second filament (wt%)	Thickness of nonwoven fabric(mm)	Tensile strength of nonwoven fabric (kgf/5cm)	Withdrawal force (kgf)	Remarks
Example 1	180	20	0.36	25/26	2.59	-
Example 2	180	15	0.36	22/23	2.30	-
Example 3	180	13	0.36	18/17	2.20	-
Example 4	180	11	0.36	17/17	2.06	-
Example 5	180	13	0.33	18/19	2.14	-
Example 6	180	13	0.40	17/16	2.31	-
Comparative Example 1	180	9	0.36	15/13	1.82	Strength defect
Comparative Example 2	180	60	0.44	27/29	-	Spinning defect
Comparative Example 3	205	11	0.36	10/11	1.92	Strength defect
Comparative Example 4	180	13	0.30	23/21	1.83	Immersion defect
Comparative Example 5	180	13	0.48	14/15	2.41	Layer peeling
The quality and thickness of nonwoven fabric due to defective spinnability of the second filaments of Comparative Example 2 were irregular. Interlayer peeling of the nonwoven fabric of Comparative Example 5 occurred.						

[0045] From the results of Table 1 above, it is confirmed that the carpets of Examples according to the present disclosure is more excellent in withdrawal force than the carpets of Comparative Examples.

[0046] From the results of Examples 3, 5 and 6, it is also confirmed that the withdrawal force of the carpets is improved as the thickness of the nonwoven fabric is increased.

[0047] On the other hand, if the thickness of the nonwoven fabric becomes excessively high (see Comparative Example 5), interlayer peeling occurs, which lowers the tensile strength of the nonwoven fabric and causes product defects.

[0048] As described above, according to the present disclosure, the withdrawal force of the carpet is improved, so that the falling out of BCF yarns from the carpet is suppressed, thereby improving the quality of the carpet.

[Industrial Applicability]

[0049] The present disclosure improves the fixing capability of BCF yarns in the carpet, and is the technology applied to a nonwoven fabric constituting the carpet and the carpet manufacturing process using the nonwoven fabric to improve the quality of the carpet, it can be used in the carpet industry.

Claims

1. A nonwoven fabric having enhanced withdrawal force for a carpet backing fabric, which comprises: 50 to 90% by weight of polyester first filaments having a melting point of 250°C or higher and 10 to 50% by weight of low-melting point copolyester second filaments having a melting point of 200°C or lower, wherein loop withdrawal force of carpets is 2.0 to 3.0 kgf (Method KS K ISO 4919).

2. The nonwoven fabric having enhanced withdrawal force for a carpet backing fabric according to claim 1, wherein the thickness of the nonwoven fabric is in the range of 0.33 to 0.46 mm while having the weight per unit area of 70 to 110 g/m^2.

3. The nonwoven fabric having enhanced withdrawal force for a carpet backing fabric according to claim 1, wherein the first filament has a fineness of 4 to 10 denier, and the second filament has a fineness of 1 to 5 denier.

4. The nonwoven fabric having enhanced withdrawal force for a carpet backing fabric according to claim 1, wherein the first filaments and the second filaments of the nonwoven fabric are heat-bonded by a hot air due to a heated air stream.

5. A method for producing a nonwoven fabric having enhanced withdrawal force for a carpet backing fabric, comprising:

a blend-spinning step of spinning and blending a first filament made of a polyester having a melting point of 250°C or higher and a second filament made of a low melting point copolyester having a melting point of 200°C or lower;
a step of blend-spinning and laminating the first filament to have a content of 50 to 90% by weight and the second filament to have a content of 10 to 50% by weight to form a web;
a step of subjecting the web to a calendering process using smooth rolls to produce a nonwoven fabric; and
a step of tufting the nonwoven fabric and treating the fabric with a coating material to manufacture a carpet.