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Heel lining for the shoe industry

Description

10 This invention relates to a heel lining for the shoe industry and to a process for producing same.

The shoe industry employs particularly abrasion-resistant materials for lining the rear part of a shoe, 15 the heel pad. These materials shall not only absorb the forces exerted by the foot on the shoe in the longitudinal direction especially in the course of the flexing action of walking, but also withstand the friction forces created by the foot, which during the 20 walking action slides at least partially up and down in the shoe. To avoid any inadvertent slipping of the foot out of the shoe in the course of the flexing action of walking, the heel part of the shoe is traditionally lined with a suedelike material which exerts friction 25 on the foot or the stocking of the wearer and so prevents the foot slipping out of the shoe.

As well as heel linings made of natural materials, there are also heel linings made of synthetic materials. 30 These synthetic materials are needlefelt nonwoven fabrics which are produced dry, by carding from polyester, viscose, polyamide, polypropylene fibers or blends thereof. To this end, cardwebs having a basis weight of up to 800 g/m² are provided and mechanically 35 consolidated by intensive needling. This operation alone is very time intensive and hence relatively costly. The needlefelt nonwoven fabric is then usually

subjected to a shrinkage treatment using hot air or steam to densify the material and to further consolidate it to achieve the density desired for the intended application. To obtain the requisite strength parameters such as tear initiation and tear propagation resistance for the needlefelt nonwoven fabric, it is impregnated with a thermally coagulable latex binder dispersion such as styrene-butadiene rubber SBR or nitrile-butadiene rubber NBR and then dried. The latex fraction amounts to about 30-60% by weight of the impregnated nonwoven fabric weight. The material thus prepared is split into two to four thinner layers. This splitting operation originated in the leather industry and has been adopted for nonwoven fabrics in order that the productivity of nonwoven fabric manufacture may be increased. The split products can additionally be incipiently ground to uniformize the surface and to improve the visual finish. Finally, a hotmelt adhesive is applied to one of the two faces in order that further processing may be simplified. Disadvantages of prior art synthetic heel lining are in particular the vastly different strength values in the longitudinal direction and in the transverse direction; the strength loss which ensues from the splitting of the fiber bundles which are vertically disposed from the needling operation; and the nonuniformities between the needle entry face and the needle exit face of the individual layers.

It is an object of the present invention to provide a heel lining for the shoe industry that combines basis weights of from 180 to 350 g/m² with tear initiation and tear propagation strengths of > 15 N not only in the longitudinal but also in the transverse direction.

It is a further object of the present invention to provide a process which is particularly suitable for producing such a heel lining.

The first object is achieved according to the invention

by a heel lining for the shoe industry, composed of a polymer-impregnated nonwoven fabric having basis weights of from 180 to 350 g/m² and tear strengths of > 15 N not only in the longitudinal but also in the transverse direction, wherein said nonwoven fabric is composed of multicomponent filaments having a linear density of < 2 dtex which are spun from the melt, aerodynamically stretched, directly laid down to form a web and subjected to a preconsolidating operation before being at least 90% split into supermicrofilaments having a linear density of < 0.2 dtex and consolidated. These heel linings possess high tensile strengths and abrasion resistances coupled with low basis weights.

Preference is given to a heel lining wherein said multicomponent filament is a bicomponent filament of two incompatible polymers, especially of a polyester and a polyamide. The multicomponent filament as a result possesses good splittability and a very favorable ratio of strength to basis weight.

Preference is given to a heel lining wherein the polyester fraction in the multicomponent filament is higher than the polyamide fraction, especially in the range from 1.1:1 to 3:1 for the weight ratio of polyester fraction to polyamide fraction. The heel lining as a result possesses a very textile hand and good aging resistance.

Particular preference is given to a heel lining wherein the multicomponent filaments have a cross section having an orangelike multisegment structure in which segments each containing one of the two incompatible polymers alternate.

Preference is given to a heel lining wherein the nonwoven fabric formed from the multicomponent filament is precalendered for preconsolidation. The material as

- a result possesses very good thickness uniformity. Particular preference is further given to a heel lining wherein at least one of the incompatible polymers forming the multicomponent filament contains an additive, such as color pigments, permanently active antistats and/or hydrophilicity or hydrophobicity modifiers in amounts of up to 15% by weight. The heel lining as a result can be positively influenced with regard to its lightfastness, the electrostatic charge buildup tendency, the perspiration transfer and/or the moisture buildup effect. Moreover, the addition of color pigments to the spinning solution permits the production of deep and abrasion-resistant colors.
- 15 Particular preference is further given to a heel lining wherein the multicomponent filament is uncrimped, since this ensures the textile hand resulting from the good splittability into supermicrofilaments.
- 20 Particular preference according to the invention is given to the heel lining wherein the nonwoven fabric is impregnated with from 20 to 50% by weight of a polymer, based on the starting weight of the nonwoven fabric. The heel lining has superior strength properties over
- 25 the familiar synthetic heel lining materials for comparable degrees of impregnation.

In an advantageous heel lining, one of the faces is provided with an application of hotmelt adhesive. Such

30 a material is particularly suitable for further processing on automatic machines.

The process provided by the invention for producing the heel lining is characterized in that multicomponent

35 filaments are spun from the melt, aerodynamically stretched and directly laid down to form a web, a preconsolidation is effected by precalendering or needling and the nonwoven fabric is consolidated using high pressure fluid jets and at the same time split

into supermicrofilaments having a linear density of
< 0.2 dtex and subsequently impregnated with a polymer.
The products thus obtained are very uniform with regard
to strength, since the distribution of fiber in the
5 product is substantially isotropic. The products have
no tendency to delaminate and have high moduli and also
tear initiation and tear propagation strengths.

In a further advantageous embodiment of the process,
10 the consolidation and splitting of said multicomponent
filaments is effected by subjecting the preconsolidated
fabric repeatedly to high pressure water jets
alternately from both sides. This form of consolidating
and splitting the multicomponent filaments leads to
15 very dense nonwoven fabrics having smooth surfaces.

Preferably, the consolidating and splitting of the
multicomponent filament is carried out on an assembly
having rotating sieve drums. This form of assemblies
20 permits the construction of very compact equipment.

In a particularly preferred manner, the impregnating of
the web which has been predominantly split into
supermicrofilaments and consolidated is effected using
25 an aqueous polyurethane or NBR latex dispersion. This
avoids solvent residues and the impregnation with a
polymer is carried out in a particularly environment-
friendly manner.

30 Preferably, the impregnated material is subjected to an
aftertreatment by grinding or buffing. These measures
may further improve the surface finish and the hand of
the material obtained. The microfilaments present in
the structure are effective to provide a particularly
35 fine and superior, nubucklike surface which greatly
resembles that of natural leather.

Inventive example

A multicomponent filament composed of 65% by weight of polyethylene terephthalate and 35% by weight of polyhexamethylenedipamide is used to produce a fleece having a basis weight of about 160 g/m². The starting filaments have a linear density of about 1.8 dtex and consist of 16 alternating polyester and polyamide segments disposed around a central axis like orange wedges. The melt-spun multicomponent filaments are aerodynamically stretched and randomly laid down on a belt. The fleece thus obtained is subjected to a precalendering operation at temperatures of about 95°C and a pressure of about 100 bar. Mechanical preconsolidation by needling is followed by a water jet treatment at a water pressure of about 100 bar. This is followed by the splitting of the multicomponent filaments into supermicrofilaments having a linear density of about 0.1 dtex and a consolidation of the nonwoven fabric by means of high pressure water jets. The treatment is carried out twice on each side at water pressures of from 250 to 300 bar and on sieve supports from 60 to 100 mesh. The web is subsequently dried and subjected to an impregnation with a polymer by means of a dry-on-wet treatment with NBR latex. About 125% by weight of NBR based on the starting weight of the nonwoven fabric is applied and fixed by drying at 180°C. Incipient grinding provides a heel lining 260 g/m² in weight and 0.75 mm in thickness.

30 Comparative example

Polyester and polypropylene staple fibers are subjected to intensive needling to produce a nonwoven fabric which is impregnated with NBR. Splitting provides a heel lining 320 g/m² in basis weight and 0.85 mm in thickness.

A comparison of the strength values and of the abrasion resistances is shown below in table 1. The abrasion resistance was determined by clamping a sample specimen

90 mm in diameter into a rotational holder and
subjecting it to an abrasive pressure of 2.8 N/cm². The
turning angle of the holder is 50 degrees. The specimen
is tested against an abrasive element having lozenges
5 on its surface. The sample is wetted with water and set
moving cyclically to and fro, one abrasive cycle being
made up of 300 to and fro movements and being followed
by a visual assessment against a ratings standard.

		Inventive example	Comparative example
Weight	g/m ²	260	320
Thickness	mm	0.75	0.85
Surface finish	rating	1.0	1.0
10% Modulus along	N/5 cm	220	310
10% Modulus across	N/5 cm	160	85
Tear strength along	N	21	10
Tear strength across	N	21	10
Abrasion (to WN 3147/1)	rating	1.0	1.0-15

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Table 1

Claims

1. A heel lining for the shoe industry, composed of a polymer-impregnated nonwoven fabric having basis weights of from 180 to 350 g/m² and tear strengths of > 15 N not only in the longitudinal but also in the transverse direction, wherein said nonwoven fabric is composed of multicomponent filaments having a linear density of < 2 dtex which are spun from the melt, aerodynamically stretched, directly laid down to form a web and subjected to a pre-consolidating operation before being at least 90% split into supermicrofilaments having a linear density of < 0.2 dtex and consolidated.
2. A heel lining according to claim 1, wherein said multicomponent filament is a bicomponent filament of two incompatible polymers, especially of a polyester and a polyamide.
3. A heel lining according to claim 2, wherein the polyester fraction in said multicomponent filament is higher than the polyamide fraction.
4. A heel lining according to claim 3, wherein the weight ratio of polyester fraction to polyamide fraction in said multicomponent filament is in the range from 1.1:1 to 3:1.
5. A heel lining according to any of claims 1 to 4, wherein said multicomponent filaments have a cross section having an orangelike multisegment structure in which segments each containing one of the two incompatible polymers alternate.
6. A heel lining according to any of claims 1 to 5, wherein said nonwoven fabric formed from said multicomponent filaments is precalendered for preconsolidation.

7. A heel lining according to any of claims 1 to 6, wherein at least one of said incompatible polymers forming said multicomponent filament contains an additive, such as color pigments, permanently active antistats and/or hydrophilic character modifiers in amounts of up to 15% by weight.
8. A heel lining according to any of claims 1 to 7, wherein said multicomponent filament is uncrimped.
9. A heel lining according to any of claims 1 to 8, wherein said unwoven fabric is impregnated with from 20 to 50% by weight of a polymer, based on the starting weight of said nonwoven fabric.
10. A heel lining according to any of claims 1 to 9, characterized in that grinding produces a high-quality, nubucklike surface due to microfilament ends bared at the surface.
11. A heel lining according to any of claims 1 to 10, wherein one of the sides is provided with an application of hotmelt adhesive.
12. A process for producing a heel lining according to any of claims 1 to 11, characterized in that multicomponent filaments are spun from the melt, aerodynamically stretched and directly laid down to form a web, a preconsolidation is effected by cocalendering or needling and the nonwoven fabric is consolidated using high pressure fluid jets and at the same time split into supermicrofilaments having a linear density of < 0.2 dtex and subsequently impregnated with a polymer.
13. A process according to claim 12, characterized in that the consolidation and splitting of said multicomponent filaments is effected by subjecting the preconsolidated fabric repeatedly to high

pressure water jets alternately from both sides.

14. A process according to claim 13, characterized in
that the consolidating and splitting of said
5 multicomponent filament is carried out on an
assembly having rotating sieve drums.
15. A process according to any of claims 12 to 14,
characterized in that the impregnating with a
10 polymer is effected using an aqueous polyurethane
latex dispersion.
16. A process according to any of claims 12 to 15,
characterized in that its aftertreatment is
15 effected by grinding or buffing.