



(86) Date de dépôt PCT/PCT Filing Date: 2005/05/25
 (87) Date publication PCT/PCT Publication Date: 2005/12/15
 (45) Date de délivrance/Issue Date: 2013/12/24
 (85) Entrée phase nationale/National Entry: 2006/11/24
 (86) N° demande PCT/PCT Application No.: EP 2005/005627
 (87) N° publication PCT/PCT Publication No.: 2005/118947
 (30) Priorité/Priority: 2004/05/26 (EP04012429.9)

(51) Cl.Int./Int.Cl. *D06N 7/00* (2006.01),
D04H 3/005 (2012.01)
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(54) Titre : REVETEMENT DE SOL EN VINYLE COUSSINE
 (54) Title: CUSHIONED VINYL FLOOR COVERING

(57) **Abrégé/Abstract:**

The invention pertains cushioned vinyl floor coverings. For the production of cushioned vinyl floor coverings nonwoven carriers made from glass fibers are currently used. However, handling of floor coverings with glass fiber carriers is quite difficult especially when the covering is laid on stairs or sharp edges. According to the present invention a solution to overcome the disadvantages of the prior art is a cushioned vinyl floor covering comprising a nonwoven carrier that is made from different polymers. The different polymers exist either in separate filaments or together in one filament.



(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
15 December 2005 (15.12.2005)

PCT

(10) International Publication Number
WO 2005/118947 A1

- (51) International Patent Classification⁷: **D06N 7/00**, D04H 3/14
- (21) International Application Number: PCT/EP2005/005627
- (22) International Filing Date: 25 May 2005 (25.05.2005)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
04012429.9 26 May 2004 (26.05.2004) EP
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Declaration under Rule 4.17:**
— of inventorship (Rule 4.17(iv)) for US only
- Published:**
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: CUSHIONED VINYL FLOOR COVERING

(57) Abstract: The invention pertains cushioned vinyl floor coverings. For the production of cushioned vinyl floor coverings non-woven carriers made from glass fibers are currently used. However, handling of floor coverings with glass fiber carriers is quite difficult especially when the covering is laid on stairs or sharp edges. According to the present invention a solution to overcome the disadvantages of the prior art is a cushioned vinyl floor covering comprising a nonwoven carrier that is made from different polymers. The different polymers exist either in separate filaments or together in one filament.

WO 2005/118947 A1

Cushioned Vinyl Floor Covering

Description:

The invention pertains cushioned vinyl floor coverings.

Cushioned vinyl is made by applying several PVC based layers on a carrier, each layer with its own function: impregnation, surface foaming, printing, wear protection and carrier. An important step in the cushioned vinyl process is the foaming step, where the top layer and back layer are being foamed at elevated temperatures and by which the cushioned product is acquired.

Currently wet laid nonwoven glass fleeces are used as carrier in the cushioned vinyl process. They fulfil the requirements to obtain a stable process and a dimensionally stable end product. Moreover, glass fleeces are cheap and can be applied in low weights of about 50 g/m².

Application of glass fleeces also has disadvantages. Handling of glass fleece might be hazardous to the health of the people concerned. Glass makes the cushioned vinyl product brittle. The product loses its stability already at low elongation levels because of the breaking of the carrier. During installation these elongation levels are often exceeded, especially in corners, on stairs or other places where the product is being folded. The surface becomes uneven at these places. The glass carrier also leads to low tear strength of the product and installers have to be careful not to tear the product, especially on places where cuts have to be made. Transport of cushioned vinyl should happen not without precaution. When a roll is bended too much, the brittle structure causes the roll to break.

For these reasons, the market demands for glass free carriers for cushioned vinyl. To overcome the disadvantages that are described the use of thermoplastic nonwoven carriers can be considered. Application of thermoplastic nonwoven carriers results in much easier and less sensitive installation of the cushioned vinyl product by having higher elongation capacity than glass fleeces. Also thermoplastic nonwoven carriers do not have any negative influence on the health of operators working with these products. Moreover non woven glass fiber carriers are currently only available in 4m width or less. Since producers of cushioned vinyl floor coverings try to satisfy the need for 5m wide cushioned vinyl floor coverings there is also a demand for 5m wide carriers that meet the requirements for cushioned vinyl floor coverings.

Thermoplastic nonwovens are not widely used for cushioned vinyl because of their lower mechanical and thermal stability as compared to glass. Low stability might cause thermal shrinkage, formation of creases and too much loss of product width.

A general demand to carriers for cushioned vinyl is surface regularity, necessary to apply the impregnation layer regularly over the full width (4 m – 5 m). Furthermore structure openness is needed for penetration of the PVC gel through the carrier in order to have sufficient delamination strength between the top layers and the back cushioned layer. Finally good bonding of the gel to the carrier is needed to have good process speed.

Solutions have been presented for making stable thermoplastic nonwoven carriers for cushioned vinyl but these solutions did not meet with all requirements, either missing an open structure or enough surface regularity or economical attractiveness compared to glass fleece. A possible option to improve the stability by increasing the weight can only be done to a limited extend in order to keep the structure open enough.

Document FR 2.013.722 discloses a nonwoven mat made from nylon (polyamide) filaments with a vinyl chloride coating usable as floor covering. The nonwoven mat

is bonded by hydrogen bonds at the points of intersection of the filaments. In this way it seems hardly possible to obtain a carrier with an acceptable stability.

U.S. Patent No. 4,234,651 discloses a process for the manufacture of a nonwoven product having high shear strength and dimensional stability. This product may be used for cushioned vinyls. The product comprises polyethylene terephthalate (PET) filaments and it exhibits a unit area weight of 150 – 400 g/m². Such high unit area weight will make the necessary impregnation quite difficult .

U.S. Patent No. 4,363,845 discloses a nonwoven fabric made from thermoplastic filaments having a PVC coating that may be used as cushioned vinyl floor covering. Although this nonwoven fabric has high dimensional stability, production is quite laborious as a multiplicity of filament groups and individual filaments must be intermixed and subsequently bonded with a secondary binder. In order to achieve the necessary stability an unit area weight of about 200 g/m² is required.

It is an object of this invention to overcome the disadvantages of the prior art.

According to the present invention a solution to overcome the described disadvantages of the prior art is a cushioned vinyl flooring comprising a nonwoven carrier characterised in that the nonwoven carrier is made from different polymers and that the different polymers exist either in separate filaments or together in one filament. It would therefore be possible that the nonwoven carrier comprises two filament types. The two filament types are predominantly made from different polymers with different melting points, so-called bifil types. The term predominantly as used herein means at least 90%. It is preferred that the melting points of the two different polymers differ by at least 10°C. More preferably the melting points differ by at least 50°C. Such a product could also be thermally bonded by subjecting the nonwoven product to a temperature in the range of the melting point of the polymer with the lower melting point. However, this nonwoven product would not be bonded at each crossing point since fibers comprising the polymer with the higher melting point might cross each other. Only crossing points of fibers

in a combination high and low melting point or low and low melting point would be bonded and not the crossing points of fibers with high melting point.

A nonwoven carrier made from bicomponent filaments is therefore preferred. The bicomponent filaments of the nonwoven carrier are thermally bonded.

Bicomponent filaments are filaments of two polymers of different chemical construction. A basic distinction is being drawn between three types: side by side types, sheath core types and matrix/fibrill types. In a preferred embodiment the nonwoven carrier is predominantly made from sheath core type filaments.

In another preferred embodiment the melting points of two polymers building the bicomponent filaments differ by at least 10°C. More preferably the melting points differ by at least 50°C.

In this embodiment the core acts as the backbone with the sheath being the bonding medium of the backbone. The structure of such a product becomes very stable because the filaments are bonded at each crossing point of the filaments thus creating a nonwoven with the highest quantity of bonding points. The dimensional stability of the nonwoven carrier can be made regular over the length and width by optimising the filament distribution. This structure gives enough resistance to the high local impregnation pressure needed for obtaining a smooth impregnated surface over the full width. The great number of bonding points provides a stable nonwoven carrier already at low area unit weights while leaving enough open space for penetration of the PVC gel through the nonwoven carrier which ensures good mechanical bonding of the PVC layer to the nonwoven carrier and good adhesion of the subsequently applied cushion layer. The uniform stability of the nonwoven carrier made from bicomponent filaments prevents crease formation and neck-in during the foaming process.

The properties of the described nonwoven carrier made from bicomponent filaments make possible a stable processing at lower weight and thickness as compared to other thermoplastic nonwoven carriers for cushioned vinyl floor coverings.

In a preferred embodiment the sheath consists mainly of polyamide and the core consists mainly of polyester. In a more preferred embodiment the sheath consists mainly of polyamide 6 and the core consists mainly of polyethylene terephthalate. Preferably the sheath/core ratio lies between 95/5 Vol-% and 5/95 Vol-%. More preferably the sheath/core ratio lies between 50/50 Vol-% and 5/95 Vol-%.

A low weight of the nonwoven carrier in the range of 40 g/m² - 140 g/m², preferably 50 g/m² - 100 g/m², is needed to keep the carrier open enough for penetration of the impregnation layer and mechanical adhesion of this layer to the carrier. Lower thickness results in less consumption of impregnation material. In this way the bicomponent thermoplastic nonwoven carrier becomes an economically feasible alternative for glass fleece.

A thermally bonded nonwoven material made from bicomponent filaments with a polyester core and a polyamide sheath that is suitable for use in cushioned vinyl floor coverings is sold under the name Colback[®] as carpet carrier. Colback[®] is also available in 5m width.

What is claimed is:

1. A cushioned vinyl floor covering comprising a nonwoven carrier impregnated with PVC gel characterised in that the nonwoven carrier is made from different polymers, that the different polymers exist either in separate filaments at least 90% made from different polymers with different melting points or together in one filament and that the nonwoven carrier is thermally bonded by a polymer originating from the filaments.
2. A cushioned vinyl floor covering according to claim 1 characterised in that the nonwoven carrier is at least 90% made from bicomponent filaments.
3. A cushioned vinyl floor covering according to claim 2 characterised in that the nonwoven carrier is at least 90% made from sheath/core filaments.
4. A cushioned vinyl floor covering according to claim 2 or 3 characterised in that the nonwoven carrier comprises sheath/core filaments with a sheath/core ratio between 95/5 Vol-% and 5/95 Vol-%.
5. A cushioned vinyl floor covering according to any one of claims 2 to 4 characterised in that the nonwoven carrier is at least 90% made from sheath/core filaments with a polyester core and polyamide sheath.
6. A cushioned vinyl floor covering according to any one of claims 1 to 5 characterised in that the nonwoven carrier has a unit area weight of 40 g/m² - 140 g/m².

7. A cushioned vinyl floor covering according to claim 6 characterised in that the nonwoven carrier has a unit area weight of 50 g/m^2 - 100 g/m^2 .