

Description

The present invention relates to carpet tiles and to a method of producing carpet tiles. More particularly, the invention concerns a carpet tile of improved dimensional stability having a secondary backing sheet and a method of producing a carpet tile of good dimensional stability and at low cost.

Carpet tiles having a fibrous face or wear surface and a solid backing layer composed of a hot melt composition, such as bitumen or atactic polypropylene, are well known (see for example US-A-4582554 and US-A-4,737,221). These patents describe methods of producing carpet tiles with a hot melt bitumen composition backing layer by supporting a carrier, such as an endless belt or a secondary backing layer, applying a layer of a bitumen hot melt composition in liquid form to the carrier, laminating the back surface of a carpet material, which optionally may be precoated, to the liquid hot melt composition on the carrier, cooling the carpet laminate and cutting the carpet laminate into carpet tile.

A laminate sheet material may be employed on a carrier belt rather than employing a separate, releasable, endless carrier belt, so that the laminated material becomes a direct part, as a secondary backing, of the carpet tile so produced. The backing sheet may be a laminate of glass and polyethylene film, with the film surface being applied directly to the carrier belt. Suitable laminate backing sheets disclosed include a laminate of glass and polyethylene film or glass-polyethylene-glass or a polyester fabric or paper-polyethylene film. In this method, the laminate backing sheets must be substantially resistant to the penetration therethrough of the hot melt, liquid composition. The backing sheet is useful in providing non-slip and dimensional stability characteristics to the resulting carpet tile.

In one method of producing carpet tile, a layer of hot melt composition, such as a modified bitumen composition, is coated on an elongated, fibrous carrier sheet and the carrier sheet becomes a secondary backing for the carpet tile. Normally, polypropylene or a blend of polypropylene and polyester non-woven fibers are employed as the secondary backing carrier sheet. However, the polypropylene sheet has a low melt and distortion temperature, for example 20°C to 30°C below the application temperature of the hot melt composition, such as temperatures of 130°C or above. The hot melt composition is applied to the carrier sheet material or a carrier belt at a temperature sufficient to provide for a liquid, viscous, hot melt composition of defined thickness, e.g. 0.5 to 1.5 mm (20 to 60 mils), such as at a temperature of generally 140°C to 170°C, for example 150°C to 160°C, which leads to the distortion of the polypropylene fibrous sheet. Therefore, polypropylene, non-woven sheet material is not a satisfactory material as a secondary backing carrier sheet.

There has been used as a secondary backing sheet a synthetic fiber backing carrier sheet, for example composed of expensive, high temperature-resistant polyester sheet material, such as a spun-bonded, polyester, non-woven material known as Bidim TH 100 from Rhone Poulenc. Such backing material is employed for its high heat resistance and high stability and its use tends to prevent built-up tensions in the resulting carpet tile and therefore to improve dimensional properties of the product. However, such high temperature resistant synthetic fibers, such as the polyester fibers are quite expensive.

It is desirable therefore to provide a carpet tile and a method of producing a carpet tile which provides a carpet tile of improved dimensional stability at a low cost and without the difficulties and disadvantages associated with the prior art use of carrier sheet secondary backing sheets.

The carpet tile of the invention comprises a carpet material having a wear surface and an under surface and has primary backing comprising a solid, hot melt composition and a secondary backing composed of adjacent layers of a porous, glass fiber sheet material, e.g. tissue, non-woven, glass fiber, and a porous, fibrous sheet material, with the fibrous sheet material as the exterior surface of the secondary backing layer and wherein the hot melt composition has penetrated and saturated the glass fiber material but has only partially penetrated the fibrous sheet material sufficient to bond the fibrous sheet material. Typically, the carpet tile comprises a fibrous carpet material wherein the primary backing is a bitumen or a bitumen-modified hot melt composition. The secondary backing comprises separate adjacent layers of a porous, lightweight, glass fiber tissue sheet material and a lightweight, porous, non-woven, fibrous, e.g. polypropylene, sheet material and with the fibrous sheet material forming the exterior surface of the secondary backing layer and wherein the bitumen composition has penetrated only partially, e.g. 20% to 50%, through the fibrous sheet material so that the exterior surface is essentially free of the hot melt composition backing layer. It is not desirable for the hot melt composition of the backing layer to strike through the fibrous sheet material to the exterior surface.

Accordingly the invention provides a carpet tile which comprises:

- a) a carpet material having an upper wear surface and a lower under surface;
- b) a primary backing which is bonded to the lower under surface of the carpet material and which comprises at least one layer of a solid, hot melt composition having an application temperature of over

140 °C;

- c) a secondary backing which is bonded to the underside of the primary backing and which comprises:
- i) an intermediate layer of a porous, non-woven, glass fiber tissue sheet material saturated with and bonded to hot melt composition from the lowermost layer thereof in the primary backing and
 - ii) a bottom layer of non-woven, porous, temperature-sensitive, fibrous sheet material, which material tends to melt or distort at temperatures greater than 140 °C, the hot melt composition penetrating only partially through the bottom layer to bend it to said intermediate layer, and provide a lower surface which forms the exterior backing surface of the carpet tile and is free of hot melt composition.

A method of producing a carpet tile comprises placing a glass fiber sheet material on top of a porous, fibrous sheet material with the adjacent layers of the glass fiber sheet material and the fibrous sheet material in one embodiment forming a carrier sheet for the hot melt composition. The method includes applying a hot liquid, hot melt composition as a layer to the top surface of the glass fiber sheet material. The viscous, hot melt composition is then forced, such as by the employment of a roll-over-roll technique, through the porous, glass fiber material but only partially and slightly into the fibrous, non-woven sheet material so that the hot melt material composition provides a good bond between the hot melt composition forming a primary backing and the glass fiber and fibrous sheet material. As in normal carpet tile production, an additional layer or layers of a or the hot melt composition may be applied, with or without the employment of a glass fiber scrim or other sheet material placed within the primary backing. Thereafter, the carpet material is laminated to the hot melt composition at a laminating station, and thereafter, cooled in a controlled manner at a cooling station and cut at a cutting station into carpet tiles.

In one embodiment the invention provides a method of preparing a carpet material having an upper wear surface and a lower under surface, which method comprises:

- a) placing a layer of porous, non-woven, glass fiber tissue sheet material on a layer of flexible, porous, non-woven, temperature-sensitive, fibrous sheet material, which material tends to melt or distort at temperatures greater than 140 °C;
- b) applying to the upper surface of the glass fiber tissue sheet material a first layer of viscous liquid, hot melt composition at a temperature of over 140 °C;
- c) forcing viscous liquid, hot melt composition by a driven roll-over-roll applicator to penetrate the porous glass fiber tissue sheet material but only partially to penetrate the fibrous sheet material the lower surface of which is essentially free of hot melt composition;
- d) optionally placing a second layer of a porous, glass fiber sheet material on the upper surface of the first layer of hot melt composition and applying to the upper surface of said second layer of glass fiber sheet material a second layer of a viscous liquid, hot melt composition at a temperature of over 140 °C;
- e) contacting the upper surface of the first or, when present, second layer of hot melt composition with the under surface of a carpet material;
- f) cooling the hot melt composition in contact with the under surface of the carpet material to form a solid hot melt composition backing layer bonded to the under surface of the carpet material; and
- g) optionally cutting the cooled backing layer carpet material into carpet tiles.

The carpet tile and method of the invention provide a significant advantage, both in the quality, i.e. the dimensional stability, and cost of the carpet tile and in the method of producing the carpet tile. The invention permits the use of much lower cost fibrous sheet material as a secondary backing e.g. polyesters, and also a temperature sensitive fibrous sheet material, e.g. polypropylene, in place of the much higher cost and higher temperature, flame resistant fibers, such as aramid fibers, in a secondary backing. The employment of a lightweight, non-woven, flexible, fibrous sheet material, like a non-woven polypropylene sheet material, in combination with a glass fiber tissue sheet material prevents the glass fibers from breaking when bent during handling and production, while the glass fiber tissue sheet material aids in shielding the lower cost, fibrous sheet material from the high temperature of the viscous, hot melt composition layer during application. The combination of the glass fiber tissue sheet material and a non-woven, fibrous sheet material like polypropylene further helps in lending a high mechanical stability to the resulting carpet tile and provides improved dimensional stability and reduces built-up tensions normally found in the production of the carpet tile. The carpet tile and method provide for significant cost savings, a more stable secondary backing for the carpet tile, easy processing with the use of the secondary backing and considerable flexibility in the choice of secondary backing materials.

The hot melt composition can be applied to the secondary backing carrier sheet by a roll-over-roll applicator system to control the thickness of the backing layer. The use of heated doctor blades as an applicator is not desirable in that when the carrier sheet is over two meters in width, it is difficult to maintain a straight doctor blade with a loss of accuracy in backing thickness. When doctor blades are employed in the method, the carrier sheet is driven by the roller at the lamination station. The use of roll-over-roll

application tends to force the hot melt composition through the lightweight sheets of the secondary backing sheet so that the viscosity of the hot melt composition must be raised or the temperature of the hot melt composition lowered to prevent total strike through. In addition, normally the roll-over-roll application increases the tension of the carrier sheet and leads to slight elongation of the carrier sheet. However, the use of the glass fibre tissue sheet material takes up the tension since it is substantially non-stretchable unlike the temperature sensitive fibrous sheet material. The layer of the glass fiber tissue sheet material helps to shield the lower fibrous sheet material from the high temperature of the hot melt composition and to prevent shrinkage of the fibrous sheet material. For example, when a polypropylene, non-woven sheet material is used, the polypropylene fibers become soft, but are retained in a substantially non-shrink position by the adjacent contacting, stable layer of the glass fiber tissue material.

The carpet material used for the carpet tile may comprise a carpet material having a wear surface, typically a fibrous wear surface, and an under surface, which under surface may or may not be precoated to enhance tuft lock of the fibers and/or to promote better adhesion with and bonding to the backing layer. Typically, the carpet material comprises a fibrous wear surface composed of natural or synthetic fibers, such as nylon, or a mixture thereof, tufted or inserted into a primary backing sheet and suitably presents a fibrous back surface as the under surface of the carpet material.

The hot melt composition suitable for use as a backing layer may comprise any hot melt material, such as a bitumen or a modified bitumen composition or an atactic polypropylene. Typically the hot melt compositions are liquid or viscous at temperatures over 140°C such as from 145°C to 180°C and have a viscosity of 60 to 100 and up to 200 Pas (60,000 to 100,000 and up to 200,000 cps). The hot melt application temperatures would normally tend to distort low cost synthetic polyolefin fibers, such as polypropylene fibers, which tend to distort at temperatures of around 130°C to 140°C. The fibrous sheet material alone without the use of the protective glass fiber tissue sheet material would be unsuitable for the purposes of the invention. The hot melt composition may be applied in one, or generally as two separate layers, and a sheet material, such as a glass fiber scrim material, between or in the layers.

Generally and preferably, the hot melt composition comprises a bitumen-modified composition which is liquid and applied in the range of 145°C to 160°C. The composition can comprise bitumen and a particulate filler material, for example limestone or other filler particles or mixtures, and a modifying agent, such as, for example, a thermoplastic block copolymer of styrene-butadiene-styrene in an amount sufficient to provide modifying and enhanced adhesive properties to the hot melt composition. While bitumen alone may be employed, it is desirable to use a modified bitumen hot melt composition containing a minor amount, for example, 3 to 25 percent by weight, such as 5 to 20 percent, of a polymeric modifying agent to enhance flexibility and adhesive properties and reduce the viscosity of the hot melt composition. Suitable modifying polymers include, but are limited to: polybutadiene, ethylene vinyl acetates, ethylene-propylene-diene terpolymers (EPDM) and styrene-butadiene-styrene (SBS) copolymers, particularly the branch chain, thermoplastic, SBS block copolymers. The modifying polymer may be used alone or in combination and optionally and preferably the SBS copolymer is used with modifying oils to reduce the viscosity and to enhance the dispersion of the modifying polymer into the hot melt material. SBS block copolymers are normally used with modifying hydrocarbon oils, like naphthenic oils, to promote dispersion into the bitumen (see for example US-A-4,201,812). The modifying oils may be used in amount from 30% to 80%, e.g. 55% to 70% by weight of the modifying polymers. Particulate filler materials can be used to lower the price and to lower flame resistance, suitably in amount from 30% to 80% by weight, e.g. 50% to 70%, of the hot melt composition.

The glass fiber sheet material suitable for use in the secondary backing constitutes a porous glass fiber tissue sheet material, and preferably a lightweight, porous, non-woven, resin-bonded glass fiber tissue material. The tissue material should have enough porosity so that the viscous, hot melt composition may be forced therethrough at the hot melt application temperatures and yet have sufficient fibrous body to protect the underlying synthetic fibrous sheet material. The glass fiber tissue material should be heat resistant, inexpensive and non-stretchable to reduce drive tension build up. Glass fiber scrim material with regular spaced, large, open pores, is not suitable for use in the secondary backing. Suitable glass fiber tissue sheet material has a weight of 25 to 80 g/m², e.g. 30 to 40 g/m², is resin-bonded e.g. with 10% to 25% weight of a resin, and has a fiber diameter of 8 to 15 μm, e.g. 10 to 12 μm, a thickness of 0.5 to 2 mm, e.g. 0.625 to 1 mm (20 to 80 mils e.g. 25 to 40 mils), and a porosity of 2.0 to 8.0 (mm W.G.(c)), e.g. 3.5 to 4.5. The porosity is measured as pressure drop in mm H₂O for a known air flow of 2000 l/m²/second across the tissue.

The fibrous sheet material employed in combination with the glass fiber sheet material as a secondary backing comprises a porous, synthetic, fibrous sheet material, for example having a weight of 20 to 100 g/m², composed for example of an olefinic polymer. e.g. polypropylene or polyester or other fibers which

would tend to melt or be distorted at the application temperature of the hot melt composition, such as about 140°C or above. A suitable non-woven or inexpensive polyester fibrous sheet material may comprise a lightweight, porous, non-woven, tissue type material having a thickness of from 0.38 to 1.65 mm, e.g. 0.5 to 1.25 mm (15 to 65 mils, e.g. 20 to 50 mils) and having a weight of 30 to 100 g/m², e.g. 40 to 60 g/m². The non-woven, e.g. polypropylene, fibrous sheet may be resin-bonded, spun-bonded, embossed, bonded or otherwise formed into a coherent sheet material. Polypropylene fiber may be used alone or mixed with other synthetic fibers, like polyester, or the polypropylene may be used over or with a core fiber material. A lightweight polyester sheet material may also be used as a secondary backing material. Normally, lightweight fibrous sheet materials, like non-woven polyester or polypropylene, of less than 50 to 70 g/m² cannot be used as a secondary backing, since the hot melt composition would strike through to the exterior back surface, however, the use of a glass fiber tissue material helps prevent strike through and permits enough penetration to have effective bonding without strike through problems.

In one preferred embodiment, the secondary backing layers act as the carrier sheet to which the hot melt composition is applied as a backing layer. However, it is recognized that a separate carrier belt with a releasable type surface may be employed or that the hot melt composition may be applied directly to the surface of the carpet and the secondary backing applied directly to the hot melt composition. The secondary backing sheet is composed of the adjacent contacting layers of the glass fiber tissue and the fibrous sheet material. The glass fiber tissue and fibrous sheet material may be separately applied together during production. The glass fiber tissue material shields the polypropylene fibers from the high temperature of the viscous, hot melt composition, while the relatively thick polypropylene sheet material acts as a flexible carrier sheet and prevents the relatively thin glass fiber tissue material from breaking during the production and handling process. The combination provides good dimensional stability to the resulting carpet tile. The secondary backing is sufficiently porous so that during the application of the first hot melt composition backing layer, the hot melt composition may be easily forced by a roll-over-roll applicator to penetrate the glass fiber tissue and partially to penetrate the non-woven fibrous sheet so as to secure a good mechanical bond on cooling of the hot melt composition. Typically, the hot melt composition is visible through the back surface of the polypropylene sheet material but does not extend to the exterior surface. Generally, the total weight and thickness gauge of the secondary backing of the glass fiber and the non-woven fibrous sheet is from 80 to 120g/m² and 1.25 to 2.5 mm (50 to 100 mils).

The invention will now be described for the purposes of illustration only in connection with the drawings, in which:

Figure 1 is an illustrative, enlarged, sectional view of one embodiment of a carpet tile of the invention; and

Figure 2 is a schematic, illustrative, view of a method of producing a carpet tile in accordance with the invention.

Figure 1 shows a carpet tile 10 comprising a carpet material 12A having a fibrous, tufted face 12, for example of nylon, tufted through a primary backing sheet 14 and having a back surface 16. The carpet material 12A is secured to a primary backing comprising a glass fiber, tissue sheet material 26 between two separately applied backing layers 18 of a modified bitumen composition. The modified bitumen composition comprises:

Material	Parts by weight
Bitumen	27.6
SBS-block copolymer	4.9
Modifying naphthenic oil	2.5
Limestone filler	65.0
	100.0

A secondary backing comprises a lightweight, glass fiber tissue sheet material 20 (300 g/m², resin-bonded, 0.76mm (30 mils) thick and 3.8 porosity), and a spun-bonded polypropylene non-woven sheet material 22 bonded by embossing (50 g/m², 0.76 mm (30 mils) thick. A layer of solid hot melt composition 18 penetrates and saturates the layer 20 and partially penetrates layer 22 to bond the layer 22, but the exterior back surface 24 of layer 22 is free of the hot melt composition.

Figure 2 is an illustration of a method 40 of producing a carpet tile 10 wherein carpet material 12A is laid into a viscous, hot bitumen composition 18 and then laminated and the carpet passed through cooling 62 and cutting 64 zones. The method 40 uses a roll of glass fiber tissue 20 and a roll of non-woven polypropylene 22 fed through free-wheel rolls 44 with the combination of the sheets 20 and 22 forming a

carrier sheet which provides a secondary backing for the carpet tile 10. A first application layer of a viscous, liquid hot melt composition 18 at 145 °C to 155 °C and 60 to 100 Pas (60,000 to 80,000 cps) is applied by a roll-over-roll applicator comprising a larger roller 50 and a smaller, roller 48 with a scraper blade 46 to remove the bitumen composition from the clockwise rotating surface of roller 48 so as to apply a controlled thickness of the modified bitumen hot melt composition to the top surface of the glass fiber tissue sheet material 20 and to force the viscous, hot melt composition 18 through the glass tissue sheet 20 and partially and slightly into the porous polypropylene sheet 22. Thereafter, the material is cooled in a controlled cooling zone 52. Optionally, but as illustrated, a layer of glass fiber tissue material 26 is then placed on the top surface of the first backing layer and an additional primary backing layer of a hot melt composition 18 is applied over the tissue material 26 in another roll-over-roll application in the same or similar technique as in the first applicator employing heated rollers 42 and 66 with blade 56. The under surface of the carpet material 12A is then applied onto the viscous top surface of the second layer 18 and passed through opposing, driven laminating nip rolls 58-60 through a controlled cooling zone 62 to solidify the hot melt composition 18. The resulting laminated carpet material is cut into carpet tiles 10 in a cutting zone 64 and the carpet tiles 10 recovered.

The carpet tile 10 has improved dimensional stability and has a low cost, improved secondary backing sheet bonded to the primary backing.

Claims

1. A carpet tile (10) which comprises:
 - a) a carpet material (12A) having an upper wear surface (12) and a lower under surface (16);
 - b) a primary backing (18, 26, 18) which is bonded to the lower under surface of the carpet material and which comprises at least one layer of a solid, hot melt composition having an application temperature of over 140 °C;
 - c) a secondary backing which is bonded to the underside of the primary backing and which comprises:
 - i) an intermediate layer of a porous, non-woven, glass fiber tissue sheet material saturated with and bonded to hot melt composition from the lowermost layer thereof in the primary backing, and
 - ii) a bottom layer of non-woven, porous, temperature-sensitive, fibrous sheet material, which material tends to melt or distort at temperatures greater than 140 °C, the hot melt composition penetrating only partially through the bottom layer to bond it to said intermediate layer and provide a lower surface which forms the exterior backing surface of the carpet tile and is free of hot melt composition.
2. A carpet tile according to claim 1 wherein the hot melt composition comprises bitumen or atactic polypropylene.
3. A carpet tile according to claim 1 or 2 wherein the hot melt composition has an application temperature of 145 °C to 180 °C.
4. A carpet tile according to claim 1, 2 or 3 wherein the hot melt composition comprises bitumen, limestone particulate filler material and a thermoplastic block copolymer of styrene-butadiene-styrene.
5. A carpet tile according to any one of the preceding claims wherein the intermediate layer i) comprises a non-woven, resin-bonded, glass fiber, porous tissue sheet material having a porosity of 2.0 to 8.0.
6. A carpet tile according to any one of the preceding claims wherein the intermediate layer is 0.5 to 2 mm (20 to 80 mils) thick and has a weight of 25 to 80 g/m².
7. A carpet tile according to any one of the preceding claims wherein the bottom layer ii) has a weight of 20 to 100 g/m².
8. A carpet tile according to any one of the preceding claims wherein the bottom layer ii) comprises a spun-bonded polypropylene fibrous sheet material.
9. A carpet tile according to any one of claims 1 to 7 wherein the bottom layer ii) comprises a non-woven polyester sheet material having a weight of 30 to 100 g/m².

carrier sheet which provides a secondary backing for the carpet tile 10. A first application layer of a viscous, liquid hot melt composition 18 at 145 °C to 155 °C and 60 to 100 Pas (60,000 to 80,000 cps) is applied by a roll-over-roll applicator comprising a larger roller 50 and a smaller, roller 48 with a scraper blade 46 to remove the bitumen composition from the clockwise rotating surface of roller 48 so as to apply a controlled thickness of the modified bitumen hot melt composition to the top surface of the glass fiber tissue sheet material 20 and to force the viscous, hot melt composition 18 through the glass tissue sheet 20 and partially and slightly into the porous polypropylene sheet 22. Thereafter, the material is cooled in a controlled cooling zone 52. Optionally, but as illustrated, a layer of glass fiber tissue material 26 is then placed on the top surface of the first backing layer and an additional primary backing layer of a hot melt composition 18 is applied over the tissue material 26 in another roll-over-roll application in the same or similar technique as in the first applicator employing heated rollers 42 and 66 with blade 56. The under surface of the carpet material 12A is then applied onto the viscous top surface of the second layer 18 and passed through opposing, driven laminating nip rolls 58-60 through a controlled cooling zone 62 to solidify the hot melt composition 18. The resulting laminated carpet material is cut into carpet tiles 10 in a cutting zone 64 and the carpet tiles 10 recovered.

The carpet tile 10 has improved dimensional stability and has a low cost, improved secondary backing sheet bonded to the primary backing.

Claims

1. A carpet tile (10) which comprises:
 - a) a carpet material (12A) having an upper wear surface (12) and a lower under surface (16);
 - b) a primary backing (18, 26, 18) which is bonded to the lower under surface of the carpet material and which comprises at least one layer of a solid, hot melt composition having an application temperature of over 140 °C;
 - c) a secondary backing which is bonded to the underside of the primary backing and which comprises:
 - i) an intermediate layer of a porous, non-woven, glass fiber tissue sheet material saturated with and bonded to hot melt composition from the lowermost layer thereof in the primary backing, and
 - ii) a bottom layer of non-woven, porous, temperature-sensitive, fibrous sheet material, which material tends to melt or distort at temperatures greater than 140 °C, the hot melt composition penetrating only partially through the bottom layer to bond it to said intermediate layer and provide a lower surface which forms the exterior backing surface of the carpet tile and is free of hot melt composition.
2. A carpet tile according to claim 1 wherein the hot melt composition comprises bitumen or atactic polypropylene.
3. A carpet tile according to claim 1 or 2 wherein the hot melt composition has an application temperature of 145 °C to 180 °C.
4. A carpet tile according to claim 1, 2 or 3 wherein the hot melt composition comprises bitumen, limestone particulate filler material and a thermoplastic block copolymer of styrene-butadiene-styrene.
5. A carpet tile according to any one of the preceding claims wherein the intermediate layer i) comprises a non-woven, resin-bonded, glass fiber, porous tissue sheet material having a porosity of 2.0 to 8.0.
6. A carpet tile according to any one of the preceding claims wherein the intermediate layer is 0.5 to 2 mm (20 to 80 mils) thick and has a weight of 25 to 80 g/m².
7. A carpet tile according to any one of the preceding claims wherein the bottom layer ii) has a weight of 20 to 100 g/m².
8. A carpet tile according to any one of the preceding claims wherein the bottom layer ii) comprises a spun-bonded polypropylene fibrous sheet material.
9. A carpet tile according to any one of claims 1 to 7 wherein the bottom layer ii) comprises a non-woven polyester sheet material having a weight of 30 to 100 g/m².



10. A method of preparing a carpet material having an upper wear surface and a lower under surface, which method comprises:

- a) placing a layer of porous, non-woven, glass fiber tissue sheet material on a layer of flexible, porous, non-woven, temperature-sensitive, fibrous sheet material, which material tends to melt or distort at temperatures greater than 140 °C;
- b) applying to the upper surface of the glass fiber tissue sheet material a first layer of a viscous liquid, hot melt composition at a temperature of over 140 °C;
- c) forcing viscous liquid, hot melt composition by a driven roll-over-roll applicator to penetrate the porous glass fiber tissue sheet material but only partially to penetrate the fibrous sheet material the lower surface of which is essentially free of hot melt composition;
- d) optionally placing a second layer of a porous, glass fiber sheet material on the upper surface of the first layer of hot melt composition and applying to the upper surface of said second layer of glass fiber sheet material a second layer of a viscous liquid, hot melt composition at a temperature of over 140 °C;
- e) contacting the upper surface of the first or, when present, second layer of hot melt composition with the under surface of a carpet material;
- f) cooling the hot melt composition in contact with the under surface of the carpet material to form a solid hot melt composition backing layer bonded to the under surface of the carpet material; and
- g) optionally cutting the cooled backing layer carpet material into carpet tiles.

11. A method according to claim 10, wherein the viscous, hot melt composition has an application temperature of 145 °C to 180 °C.

12. A method according to claim 10 or 11, wherein the viscous liquid, hot melt composition has a viscosity of 60 to 100 Pas (60,000 to 100,000 cps) and the glass fiber tissue sheet material has a porosity of 2.0 to 8.0.

13. A method according to claim 10, 11 or 12, wherein the glass fiber tissue sheet material comprises a resin-bonded tissue sheet material and has a weight of 25 to 80 g/m².

14. A method according to any one of claims 10 to 13, wherein the temperature-sensitive fibrous sheet material has a weight of 20 to 100 g/m².

15. A method according to any one of claims 10 to 14, wherein the fibrous sheet material comprises a spun-bonded polypropylene sheet material.

16. A method according to any one of claims 10 to 15, wherein the glass fiber tissue sheet material has a porosity of 2.0 to 8.0, and a thickness of 0.5 to 2 mm (20 to 80 mils).

Patentansprüche

1. Teppichfliese (10), welche umfaßt:

- a) Teppichmaterial (12A) mit einem oberen Teppichbelag (12) und einem darunterliegenden Unterbelag (16);
- b) Primärverstärkung (18, 26, 18), die an die Unterseite des Unterbelags des Teppichmaterials gebunden ist und welche mindestens eine Schicht einer festen Heißschmelzzusammensetzung mit einer Auftragstemperatur von über 140 °C umfaßt;
- c) Sekundärverstärkung, die an die Unterseite der Primärverstärkung gebunden ist und welche umfaßt:
 - i) eine Zwischenschicht aus einem porösen, nicht-gewebten Glasfaser-Gewebsplattenmaterial, das gesättigt ist mit und gebunden an die Heißschmelzzusammensetzung aus der untersten Schicht davon in der Primärverstärkung, und
 - ii) eine Bodenschicht aus nicht-gewebtem, porösen, temperaturempfindlichen, faserigen Plattenmaterial, welches bei Temperaturen von höher als 140 °C zum Schmelzen oder Verformen neigt, wobei die Heißschmelzzusammensetzung nur teilweise die Bodenschicht durchdringt, um sie an die Zwischenschicht zu binden und eine untere Oberfläche zu bieten, die die äußere Verstärkungsoberfläche der Teppichfliese bildet und frei von Heißschmelzzusammensetzung ist.



2. Teppichfliese nach Anspruch 1, worin die Heißschmelzzusammensetzung Bitumen oder ataktisches Polypropylen umfaßt.
3. Teppichfliese nach Anspruch 1 oder 2, worin die Heißschmelzzusammensetzung einen Auftragstemperaturbereich von 145 °C bis 180 °C besitzt.
4. Teppichfliese nach Anspruch 1, 2 oder 3, worin die Heißschmelzzusammensetzung Bitumen, Füllmaterial mit Kalksteinteilchen und ein thermoplastes Blockcopolymer aus Styrol-Butadien-Styrol umfaßt.
5. Teppichfliese nach einem der vorangegangenen Ansprüche, worin die Zwischenschicht i) ein nicht-gewebtes, harzgebundenes, poröses Glasfaser-Gewebsplattenmaterial mit einer Porosität von 2,0 bis 8,0 mm W.G. umfaßt.
6. Teppichfliese nach einem der vorangegangenen Ansprüche, worin die Zwischenschicht 0,5 bis 2 mm (20 bis 80 mils) dick ist und ein Gewicht von 25 bis 80 g/m² hat.
7. Teppichfliese nach einem der vorangegangenen Ansprüche, worin die Bodenschicht ii) ein Gewicht von 20 bis 100 g/m² hat.
8. Teppichfliese nach einem der vorangegangenen Ansprüche, worin die Bodenschicht ii) ein gesponnenes faseriges Polypropylen-Plattenmaterial umfaßt.
9. Teppichfliese nach einem der vorangegangenen Ansprüche 1 bis 7, worin die Bodenschicht ii) ein nicht-gewebtes Polyester-Plattenmaterial mit einem Gewicht von 30 bis 100 g/m² umfaßt.
10. Verfahren zur Herstellung einer Teppichfliese mit einem oberen Belag und einem darunterliegenden Unterbelag, welches umfaßt:
 - a) Auflegen einer Schicht eines porösen, nicht-gewebten Glasfaser-Gewebsplattenmaterials auf eine Schicht flexiblen, porösen, nicht-gewebten, temperaturempfindlichen, faserigen Plattenmaterials, welches bei Temperaturen von höher als 140 °C zum Schmelzen oder Verformen neigt;
 - b) Auftragen auf die obere Oberfläche des Glasfaser-Gewebsplattenmaterials eine erste Schicht einer zähflüssigen Heißschmelzzusammensetzung bei einer Temperatur von über 140 °C;
 - c) Zum-Eindringen-bringen der zähflüssigen Heißschmelzzusammensetzung mittels einer beidseitigen Antriebsrollvorrichtung in das poröse Glasfaser-Gewebsplattenmaterial, doch nur zum teilweisen Eindringen in das faserige Plattenmaterial, dessen untere Oberfläche im wesentlichen frei von Heißschmelzzusammensetzung ist;
 - d) wahlweises Auflegen einer zweiten Schicht eines porösen Glasfaser-Gewebsplattenmaterials auf die obere Oberfläche der ersten Schicht der Heißschmelzzusammensetzung und Auftragen auf die obere Oberfläche dieser zweiten Schicht des Glasfaser-Plattenmaterials einer zweiten Schicht einer zähflüssigen Heißschmelzzusammensetzung bei einer Temperatur von über 140 °C;
 - e) In-Kontakt-bringen der oberen Oberfläche der ersten oder, wenn vorhanden, der zweiten Schicht der Heißschmelzzusammensetzung mit der unteren Oberfläche eines Teppichmaterials;
 - f) Abkühlen der mit der unteren Oberfläche des Teppichmaterials in Kontakt stehenden Heißschmelzzusammensetzung, um eine feste Verstärkungsschicht aus Heißschmelzzusammensetzung zu bilden, die an die untere Oberfläche des Teppichmaterials gebunden ist; und
 - g) wahlweises Schneiden des abgekühlten Teppichmaterials mit der Verstärkungsschicht zu Teppichfliesen.
11. Verfahren nach Anspruch 10, worin die visköse Heißschmelzzusammensetzung einen Auftragtemperaturbereich von 145 °C bis 180 °C besitzt.
12. Verfahren nach Anspruch 10 oder 11, worin die zähflüssige Heißschmelzzusammensetzung eine Viskosität von 60 bis 100 Pas (60.000 bis 100.000 cps) und das Glasfaser-Gewebsplattenmaterial eine Porosität von 2,0 bis 8,0 mm W.G. aufweist.
13. Verfahren nach Anspruch 10, 11 oder 12, worin das Glasfaser-Gewebsplattenmaterial ein harzgebundenes Gewebsplattenmaterial umfaßt und ein Gewicht von 25 bis 80 g/m² hat.



14. Verfahren nach einem der Ansprüche 10 bis 13, worin das temperaturempfindliche faserige Plattenmaterial ein Gewicht von 20 bis 100 g/m² hat.
15. Verfahren nach einem der Ansprüche 10 bis 14, worin das faserige Plattenmaterial ein gesponnenes Polypropylen-Plattenmaterial umfaßt.
16. Verfahren nach einem der Ansprüche 10 bis 15, worin das Glasfaser-Gewebsplattenmaterial eine Porosität von 2,0 bis 8,0 mm W.G. und eine Dicke von 0,5 bis 2 mm (20 bis 80 mils) aufweist.

10 Revendications

1. Dalle de tapis (10) qui comprend :
 - a) un matériau pour tapis (12A) comprenant une surface d'usure supérieure (12) et une surface de base inférieure (16);
 - b) un support primaire (18, 26, 18) qui est relié à la surface de base inférieure du matériau pour tapis et qui comprend au moins une couche d'une composition solide thermofusible dont la température d'application est supérieure à 140 °C.
 - c) un support secondaire qui est relié au côté inférieur du support primaire et qui comprend:
 - i) une couche intermédiaire en un matériau en feuille en tissu poreux non-tissé, en fibres de verre, saturée par la composition thermofusible et reliée à celle-ci par la couche située le plus en bas dans le support primaire, et
 - ii) une couche de base en un matériau en feuille fibreux non-tissé, poreux, sensible à la température, lequel matériau a tendance à fondre ou à se déformer à des températures supérieures à 140 °C, la composition thermofusible pénétrant seulement partiellement à travers la couche de base pour la relier à ladite couche intermédiaire et constituer une surface inférieure qui forme la surface de support extérieure de la dalle de tapis et ne comprend pas de composition thermofusible.
2. Dalle de tapis selon la revendication 1, dans laquelle la composition thermofusible comprend du bitume ou du polypropylène atactique.
3. Dalle de tapis selon la revendication 1 ou 2, dans laquelle la température d'application de la composition thermofusible est comprise entre 145 °C et 180 °C.
4. Dalle de tapis selon la revendication 1, 2 ou 3, dans laquelle la composition thermofusible comprend du bitume, un matériau de charge particulaire en calcaire et un copolymère en masse thermoplastique de styrène-butadiène-styrène.
5. Dalle de tapis selon l'une quelconque des revendications précédentes, dans laquelle la couche intermédiaire i) comprend un matériau en feuille en tissu poreux non-tissé en fibres de verre lié par une résine dont la porosité est comprise entre 2,0 et 8,0.
6. Dalle de tapis selon l'une quelconque des revendications précédentes, dans laquelle la couche intermédiaire présente une épaisseur comprise entre 0,5 et 2 mm (20 à 80 mils) et un poids compris entre 25 et 80 g/m².
7. Dalle de tapis selon l'une quelconque des revendications précédentes, dans laquelle la couche de base ii) a un poids compris entre 20 et 100 g/m².
8. Dalle de tapis selon l'une quelconque des revendications précédentes, dans laquelle la couche de base ii) comprend un matériau en feuille en polypropylène fibreux lié par filage.
9. Dalle de tapis selon l'une quelconque des revendications 1 à 7, dans laquelle la couche de base ii) comprend un matériau en feuille en polyester non-tissé présentant un poids compris entre 30 et 100 g/m².
10. Procédé pour préparer un matériau pour tapis comportant une surface d'usure supérieure à une surface de base inférieure, lequel procédé comprend:



- 5 a) la mise en place d'une couche d'un matériau en feuille poreux en tissu non-tissé en fibres de verre sur une couche d'un matériau en feuille fibreux, flexible, non-tissé poreux et sensible à la température, lequel matériau a tendance à fondre ou à se déformer à des températures supérieures à 140 °C;
- 10 b) l'application sur la surface supérieure du matériau en feuille en tissu en fibres de verre d'une première couche d'une composition visqueuse, liquide et thermofusible à une température supérieure à 140 °C;
- 15 c) le refoulement de la composition visqueuse, liquide, et thermofusible par un applicateur entraîné à rouleau sur rouleau de manière qu'elle pénètre dans le matériau en feuille en tissu de fibres de verre poreux mais seulement partiellement dans le matériau en feuille fibreux dont la surface inférieure est essentiellement exempte de composition thermofusible;
- d) optionnellement la mise en place d'une seconde couche d'un matériau en feuille poreux en fibres de verre sur la surface supérieure de la première couche de la composition thermofusible et l'application sur la surface supérieure de ladite seconde couche de matériau en feuille en fibres de verre d'une seconde couche d'une composition visqueuse, liquide et thermofusible à une température supérieure à 140 °C;
- 20 e) la mise en contact de la surface supérieure de la première ou lorsqu'elle est présente, de la seconde couche de composition thermofusible avec la surface inférieure du matériau pour tapis;
- f) le refroidissement de la composition thermofusible en contact avec la surface inférieure du matériau pour tapis pour former une couche de support en une composition solide thermofusible qui est liée à la surface inférieure du matériau pour tapis; et
- g) optionnellement la découpe du matériau pour tapis dont la couche de support est refroidie en des dalles de tapis.
- 25 11. Procédé selon la revendication 10, dans lequel la température d'application de la composition visqueuse et thermofusible est comprise entre 145 °C et 180 °C.
12. Procédé selon la revendication 10 ou 11, dans lequel la composition visqueuse, liquide et thermofusible présente une viscosité comprise entre 60 et 100 Pas (60.000 à 100.000 cps) et le matériau en feuille en tissu de fibres de verre présente une porosité comprise entre 2,0 et 8,0.
- 30 13. Procédé selon la revendication 10, 11 ou 12, dans lequel le matériau en feuille en tissu de fibres de verre comprend un matériau en feuille en tissu lié par une résine et présente un poids compris entre 25 et 80 g/m².
- 35 14. Procédé selon l'une quelconque des revendications 10 à 13, dans lequel le matériau en feuille fibreux thermosensible présente un poids compris entre 20 et 100 g/m².
- 40 15. Procédé selon l'une quelconque des revendications 10 à 14, dans lequel le matériau en feuille fibreux comprend un matériau en feuille en polypropylène lié par filage.
- 45 16. Procédé selon l'une quelconque des revendications 10 à 15, dans lequel le matériau en feuille en tissu de fibres de verre présente une porosité comprise entre 2,0 et 8,0, et une épaisseur comprise entre 0,5 et 2 mm (20 et 80 mils).
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