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**Zickell et al.**

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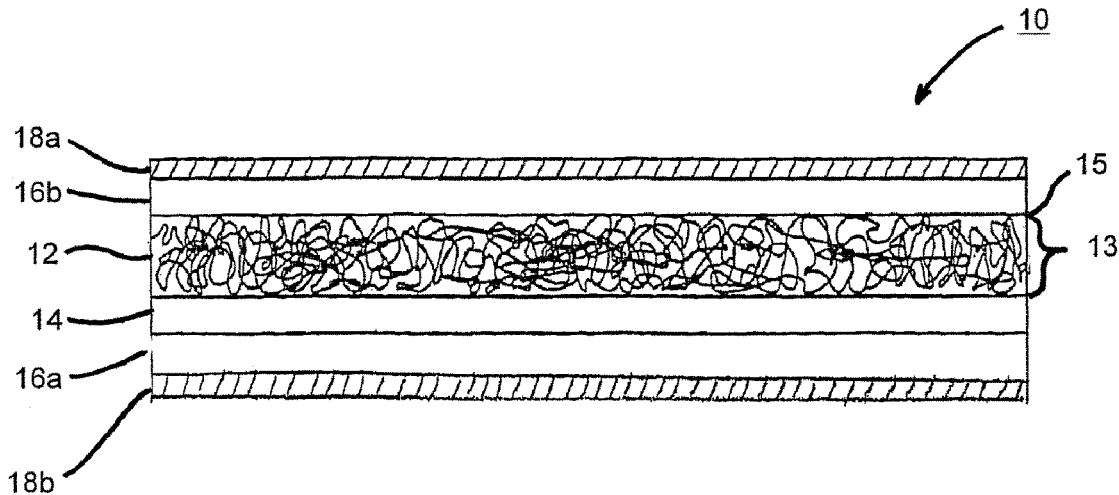
- (54) **RUBBERIZED ROOF UNDERLAYMENT**
- (71) Applicant: **Owens Corning Intellectual Capital, LLC**, Toledo, OH (US)
- (72) Inventors: **Thomas J. Zickell**, New Castle, NH (US); **James A. Karlis**, Pelham, NH (US)
- (73) Assignee: **Owens Corning Intellectual Capital, LLC**, Toledo, OH (US)
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See application file for complete search history.

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- Primary Examiner* — Cheng Huang  
(74) *Attorney, Agent, or Firm* — Calfee, Halter & Griswold LLP

(57) **ABSTRACT**

An underlayment product comprises a fibrous mat having an upper surface and a lower surface. A rubberized asphalt coating is applied to the lower surface of the fibrous mat and extends at least partially into the fibrous mat. In one heavy-weight underlayment, an oxidized asphalt coating is applied to the upper and lower surfaces of the fibrous mat generally encapsulating the fibrous mat including the rubberized asphalt coating provided on the lower surface of the fibrous mat. The oxidized asphalt layers may be coated with a release layer such as talc, granules or a polymer. In a lightweight underlayment, a split release sheet or facer segmented to provide a releasable selvedge edge and incorporating a high traction polymer on its surface is applied to the rubberized asphalt.

**8 Claims, 2 Drawing Sheets**



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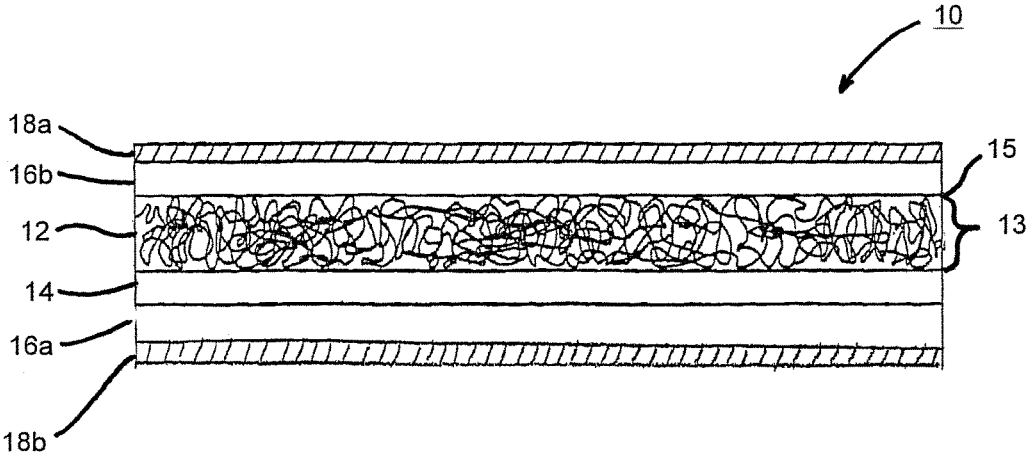
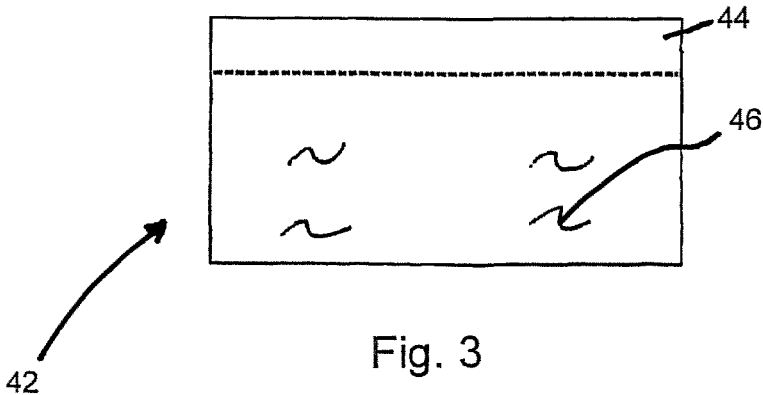
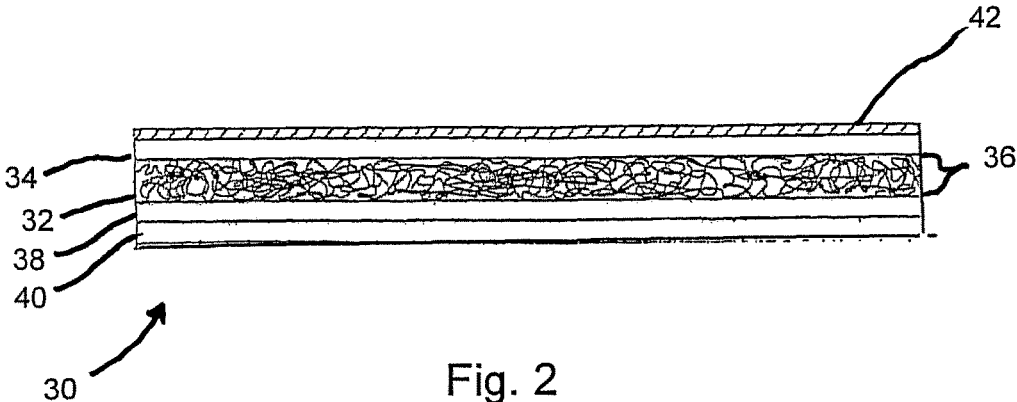


Fig. 1



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**RUBBERIZED ROOF UNDERLAYMENT****CROSS-REFERENCE TO RELATED APPLICATIONS**

This application is a continuation application of U.S. Ser. No. 12/692,084, filed Jan. 22, 2010, titled RUBBERIZED ROOF UNDERLAYMENT, which is a continuation-in-part of commonly assigned U.S. utility patent application Ser. No. 11/238,371, filed Sep. 29, 2005, now abandoned, of the same inventive entity as herein, both of which are incorporated herein by reference in their entirety.

**TECHNICAL FIELD**

The present invention relates to roof underlayments and more particularly, to heavyweight and lightweight underlayment products which utilizes a rubberized asphalt layer.

**BACKGROUND INFORMATION**

An underlayment material is commonly used in a number of roofing applications as well as other underlayment situations. The typical product utilized in roofing underlayment is commonly referred to as "tar" or "felt" paper. The traditional "tar paper" is an asphalt impregnated paper product which is sold in a roll; unrolled on a roof; cut to length; and fastened to the roof utilizing staples or nails. Although tar paper is inexpensive, it does not seal nail holes through the paper and thus does not prevent water infiltration. In addition, once the felt is rolled out, it absorbs water and once wet, it wrinkles and expands, and must be allowed to dry out before covering with shingles. Other prior art shingle underlayment products also suffer from the same problems.

Accordingly, what is needed are generally low cost, heavyweight or lightweight, dimensionally stable underlayment products on which the installer can walk, without sticking or slipping, which will not slide underfoot and which will cold flow and/or elongate and recover to seal nail holes and other punctures. In addition, such products should be dimensionally stable, resist tearing, non-adhesive to other layers, and provide hot and cold flexibility.

**SUMMARY**

The present invention features novel underlayment products which will be relatively inexpensive and replace prior art products such as "tar paper" or "felt paper". The present invention provides underlayment products with a top surface that can be walked on and will not slide under foot, and wherein the products will not stick to themselves or the roof. In addition, the present invention has "cold" flow properties which allow it to "repair" or "heal" itself to thereby reseal around nail or puncture holes and also elongate and recover around punctures.

In accordance with one embodiment of the present invention, the underlayment includes an underlayment membrane comprising a fibrous mat having an upper surface and a lower surface. An elastomeric asphalt coating is applied to the lower surface of the fibrous mat and at least partially or fully infiltrates and saturates the fibrous mat. Next, an oxidized asphalt coating is applied to both the upper and lower surfaces of the fibrous mat, thereby essentially encapsulating the fibrous mat.

The underlayment membrane may further include a release coating applied to the oxidized asphalt coating on

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either the upper and/or lower surface of the fibrous mat. The release coating includes, in one embodiment, a talc/water coating but may alternatively include granule particles applied proximate at least the oxidized asphalt coating proximate said upper surface of said fibrous mat.

The release coating may include a polymeric coating applied on at least the upper surface of the fibrous mat while the polymeric coating may be provided with a coating of finely-ground mineral, such as talc and finely-ground granules.

In the preferred embodiment, the rubberized asphalt coating which is applied from the bottom of the mat and partially or fully infiltrates the fibrous mat includes approximately 48% flux asphalt, 2% radial SBS rubber and 50% filler material while the fibrous mat includes fibers selected from the group consisting of polyesters, polypropylenes and fiberglass. The coating may, however, be provided having a range a ingredients including, but not limited to 0.5% to 12% radial or linear rubber or polymer; 0-70% filler; and 48-98% asphalt including 0-70% oxidized asphalt. The filler affects the walkability of the outer surface. If the filler content is too low such that a higher asphalt percentage exists, the product would be sticky. The high filler content and/or talc layer prevents sticking. In addition, the filler also brings down the price of the finished product.

Adding an oxidized asphalt layer on both the top and bottom layer of the mat makes the product more usable in hotter conditions providing a higher resistance to softening by providing an asphalt with a higher Ring and Ball softening point temperature. It also makes the product not stick in three ways: 1) foot traffic 2) the roof deck and 3) in the roll form.

The rubber or other elastomer in the elastomeric layer may be linear or radial rubber although with linear SBS rubber, as much as 10 or 12 percent may be required whereas with radial SBS rubber, 0.5 to 6% will generally suffice.

In the preferred embodiment, the talc coating is suspended in a water-based, polymer emulsion. Examples of the polymer include styrene, acrylic and the polyurethane. When it dries, the polymer forms a film which helps hold the talc to the asphalt so that the talc does not fall off or interfere with any overlap or bonding areas. Loose talc is a slip problem. Although a talc acrylic layer is preferred as the method to prevent sticking, a water or other based polymer may be applied and may be sufficient, as would be a plastic film.

In accordance with another embodiment of the present invention, the underlayment includes an underlayment membrane comprising a fibrous mat having an upper surface and a lower surface. An elastomeric asphalt coating is applied to the upper surface of the fibrous mat and at least partially or fully infiltrates and saturates the fibrous mat. Next, an oxidized asphalt coating is applied in one embodiment to the lower surface of the fibrous mat.

The underlayment membrane may further include a release coating applied to the oxidized asphalt coating on the lower surface of the fibrous mat. In an alternate embodiment without the oxidized asphalt layer, the release coating is applied to the lower surface of the fibrous mat. The release coating includes, in one embodiment, a talc/polymer coating.

The underlayment membrane may further include a split release facing having a high traction surface that is applied to the rubberized asphalt coating on the upper surface of the fibrous mat. The split release facing having a high traction surface, in one embodiment, provides a selvedge edge and

includes a plurality of separate and distinct regions bearing a high traction polymer blend.

In the preferred lightweight underlayment embodiment, the rubberized asphalt coating which is applied onto the top of the mat and partially or fully infiltrates the fibrous mat includes approximately 48% flux asphalt, 2% radial SBS rubber and 50% filler material while the fibrous mat includes fibers selected from the group consisting of polyesters, polypropylenes and fiberglass. The coating may, however, be provided having a range a ingredients including, but not limited to 0.5% to 12% radial or linear rubber or polymer; 0-70% filler; and 48-98% asphalt including 0-70% oxidized asphalt. The filler affects the walkability of the outer surface. If the filler content is too low such that a higher asphalt percentage exists, the product would be sticky. The high filler content and/or talc layer prevents sticking. In addition, the filler also brings down the price of the finished product.

The rubber or other elastomer in the elastomeric layer may be linear or radial rubber although with linear SBS rubber, as much as 10 or 12 percent may be required whereas with radial SBS rubber, 0.5 to 6% will generally suffice.

It is important to note that the present invention is not intended to be limited to a system or method which must satisfy one or more of any stated objects or features of the invention. It is also important to note that the present invention is not limited to the preferred, exemplary, or primary embodiment(s) described herein. Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention, which is not to be limited except by allowed claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

These and other features and advantages of the present invention will be better understood by reading the following detailed description, taken together with the drawings wherein:

FIG. 1 is a schematic sectional view of the heavyweight underlayment of the present invention;

FIG. 2 is a schematic sectional view of the lightweight underlayment of the present invention;

FIG. 3 is a schematic top plan view of the lightweight underlayment of the present invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention features novel underlayment products which will be relatively inexpensive and replace prior art products such as "tar paper" or "felt paper". The present invention provides underlayment products with a top surface that can be walked on and will not slide under foot, and wherein the products will not stick to themselves or the roof. In addition, the present invention has "cold" flow properties and elongate and recovery properties which allow it to reseal around nail or puncture holes.

The heavyweight underlayment **10**, FIG. 1, in accordance with the present invention includes a fibrous mat **12** disposed in the center of the underlayment. Examples of and equivalents for the fibrous mat **12** are disclosed in U.S. Pat. Nos. 6,531,200 and 6,296,912 assigned to the assignee of the present invention and incorporated fully herein by reference.

The fibrous mat **12** is first coated proximate one side with a rubberized asphalt layer **14**. The rubberized asphalt layer **14** typically comprises approximately 4% rubber, 46% flux asphalt and 50% filler, although various percentages may be provided. These percentages are approximate and those

skilled in the art would understand that a deviation from these percentages is considered within the scope of the present invention.

The rubberized asphalt layer **14** exhibits "cold flow" or "self-healing" properties by virtue of the inclusion of a relatively small percentage of rubber. Accordingly, when the underlayment **10** is punctured, such as by a nail, the rubberized asphalt layer **14** will "self-heal" around the puncture thereby resealing around the puncture. This is particularly important when underlayment is used under roofing tile in which case the tiles are fastened to the roof using "ring" nails which create a hole which is larger than the nail shank itself. In this case, the rubber in the underlayment will actually stick to the ridges in the nail shank and stretch around the nail shank thereby creating a generally watertight seal around the shank of the nail. Without the "self-healing" properties of the rubberized asphalt layer **14** of the underlayment **10** of the present invention, persistent roof leaks abound.

In the preferred embodiment, the rubber includes "SBS" radial rubber although linear rubber, in a higher content percentage, would also be acceptable. The SBS rubber is mixed with the flux asphalt using a high shear mill, as is well known in the art. The rubberized asphalt layer **14** is applied to only one side of the fibrous mat **12**. This one-sided application serves to vaporize and drive out any moisture trapped in the fibrous mat **12**. Examples of how to coat fibrous mats on one side can be found in the two referenced United States patents previously fully incorporated by reference.

The rubberized asphalt layer **14** infiltrates at least partially but also can extend fully into the central region **13** of fibrous mat **12**.

After the application of the rubberized asphalt layer **14** to one side of the fibrous mat **12**, oxidized asphalt layers **16a** and **16b** are applied; with oxidized asphalt layer **16a** applied over the rubberized asphalt layer **14** while the oxidized asphalt layer **16b** is applied directly to the fibrous mat on the side opposite the rubberized asphalt layer **14**. Accordingly, in the preferred embodiment, the interface between the rubberized asphalt layer **14** and the oxidized asphalt layer **16b** will occur in region **13** of fibrous mat **12** and not proximate or on the upper surface **15** of fibrous mat **12**. If the interface between the oxidized asphalt layer **16b** and the rubberized asphalt layer **14** is proximate or at the upper surface **15** of fibrous mat **12**, the oxidized asphalt layer **16** exhibits a tendency to slip or shear away from the rubberized asphalt layer particularly due to foot traffic when the product was installed on a hot roof. This presents a dangerous situation and also one where the product would have a tendency to adhere to an adjacent layer.

As is well known in the prior art, an oxidized asphalt layer typically includes approximately 50% oxidized asphalt and 50% filler. The oxidized asphalt layer **16b** will become the top surface of the underlayment **10**. Since there is no rubberized asphalt layer under the oxidized asphalt layer **16b**, anyone walking on this product will not slip given the propensity of oxidized asphalt layer to break away from the rubberized asphalt layer if the rubberized asphalt later were located directly beneath the top oxidized asphalt layer and not within the fibrous mat **12**.

Finally, the top and bottom of the underlayment **10** is coated with a talc acrylic layer **18**. The talc acrylic layer **18** provides an additional coating to the oxidized asphalt layers, filling in any voids that are present and preventing the membrane from sticking to itself when the rolled. The talc layer **18** is applied as a talc/water or talc polymer mixture as

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described, for example, in U.S. Pat. No. 6,531,200. In an alternative embodiment, talc layer **18a** may be replaced with or include granular particles.

The lightweight underlayment **30**, FIG. 2, in accordance with the present invention includes a fibrous mat **32** disposed in the center of the underlayment. Examples of and equivalents for the fibrous mat **32** are disclosed in U.S. Pat. Nos. 6,531,200 and 6,296,912 already incorporated by reference hereinabove. The fibrous mat **32** is first coated proximate its upper side with a rubberized asphalt layer **34**. The rubberized asphalt layer **34** typically comprises approximately 4% rubber, 46% flux asphalt and 50% filler, although various percentages may be provided. These percentages are approximate and those skilled in the art would understand that a deviation from these percentages is considered within the scope of the present invention.

The rubberized asphalt layer **34** exhibits "cold flow" or "self-healing" properties by virtue of the inclusion of a relatively small percentage of rubber. Accordingly, when the underlayment **30** is punctured, such as by a nail, the rubberized asphalt layer **34** will "self-heal" around the puncture thereby resealing around the puncture. This is particularly important as discussed above when underlayment is used under roofing tile in which case the tiles are fastened to the roof using "ring" nails which create a hole or puncture which is larger than the nail shank itself.

In the preferred embodiment, the rubber includes "SBS" radial rubber although linear rubber, in a higher content percentage, would also be acceptable and is contemplated. The SBS rubber is mixed with the flux asphalt using a high shear mill, as is well known in the art. The rubberized asphalt layer **34** as for the embodiment **10** described hereinabove is applied to only one side of the fibrous mat **32**, which serves to vaporize and drive out any moisture trapped in the fibrous mat **32**. Examples of how to coat fibrous mats on one side can be found in the two referenced United States patents previously fully incorporated by reference.

The rubberized asphalt layer **34** infiltrates at least partially but also can extend fully into the central region **36** of fibrous mat **32**.

After the application of the rubberized asphalt layer **34** to the top of the fibrous mat **32**, an oxidized asphalt layer **38** in one embodiment is applied directly to the fibrous mat underside opposite the rubberized asphalt layer **34**. As is well known in the prior art, an oxidized asphalt layer typically includes approximately 50% oxidized asphalt and 50% filler.

The bottom of the underlayment **30** is coated with a talc acrylic layer **40**. The talc acrylic layer **40** provides an additional coating to the oxidized asphalt layer **34**, filling in any voids that are present and preventing the membrane from sticking to itself when rolled. In an alternate embodiment, the oxidized asphalt layer **38** is not used, and the talc acrylic layer **40** is applied directly to the underside of the fibrous mat **32**. The talc acrylic layer **40** in either embodiment is applied as a talc/water or talc polymer mixture as described, for example, in U.S. Pat. No. 6,531,200.

The top of the underlayment **30** is coated with a split release facer having high traction surface generally designated **42**. As best seen in FIG. 3, the facer **42** is segmented to include a first removable selvage edge segment **44** and a second segment providing a high traction surface schematically illustrated at **46**. As will be readily appreciated by those of skill in the art, removal of the selvage edge segment **44** exposes the adhesive surface of the rubberized asphalt, which provides adhesion of successive courses to each other, the exposed rubberized adhesive edge of one

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course to the talc/polymer layer of another partially overlapping course. Any suitable facer adapted to provide a removable selvage edge while preventing or reducing self-adhesion when rolled, such as facers provided with partially overlapping edge portions, or with underlay strips as in U.S. Pat. No. 5,916,654 to Phillips et al., incorporated herein by reference, or with pull strings as in U.S. Pat. No. 6,235,364 to Schaughency et al., incorporated herein by reference, or laser slit as disclosed in commonly assigned and co-pending U.S. utility patent application Ser. No. 11/749,360, filed on May 16, 2007, entitled Self-adhesive Product Having a Laser Slit Release Liner and Method of Making Same, incorporated herein by reference, may be employed.

The high traction portion **46** preferably is formed of one or more separate and distinct polymer regions disposed on the upper side of the facer **42** that is softer than the material substratum of the facer **42** to provide a high traction surface. The high traction polymer regions may be arranged in any suitable pattern, such as strips, or dots. In one presently preferred embodiment, the high traction polymer is arranged in spaced-apart longitudinally extending strips on a 0.5 mil or 0.25 mil polyethylene film and is fabricated of a blend comprising a mixture of low molecular weight polyethylene and amorphous polyolefin, as disclosed in commonly assigned U.S. Pat. No. 6,385,934 to Zickell et al., incorporated herein by reference.

Accordingly, the present invention provides novel and useful underlayment products which can be used under many roofing or other materials as a substrate or underlayment, which serves to self-seal around any penetrations such as nails and the like.

As mentioned above, the present invention is not intended to be limited to a system or method which must satisfy one or more of any stated or implied object or feature of the invention and should not be limited to the preferred, exemplary, or primary embodiment(s) described herein. Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention, which is not to be limited except by the allowed claims and their legal equivalents.

The invention claimed is:

1. An underlayment membrane comprising:
  - a fibrous mat having an upper surface and a lower surface extending longitudinally between first and second ends;
  - a rubberized asphalt coating applied to the upper surface of the fibrous mat and extending at least partially into said fibrous mat, said rubberized asphalt coating comprising 0.5% to 12% radial or linear rubber or polymer, 0% to 70% filler, and 48% to 98% asphalt;
  - an oxidized asphalt coating applied to said lower surface of said fibrous mat; and
  - a split facer sheet applied directly to said rubberized asphalt coating applied to the upper surface of the fibrous mat to define a top portion of the underlayment membrane, the split facer sheet comprising a polymeric film segmented along a longitudinal axis to separate the polymeric film into first and second coplanar segments of the split facer sheet, the first segment comprising a removable selvage edge segment removable to expose an underlying portion of the rubberized asphalt coating to allow partial overlapping of successive courses during installation and the second segment comprising a plurality of spaced apart and distinct traction surface regions applied to an upper side of the polymeric film



that are softer than a material substrate of the split facer layer so as to reduce if not eliminate applicator slippage during installation.

2. The underlayment membrane of claim 1 further including a release coating applied to said lower surface of said fibrous mat. 5

3. The underlayment membrane of claim 2 wherein said release coating includes a talc/polymer coating.

4. The underlayment membrane of claim 1 further including a release coating applied to said oxidized asphalt coating applied to said lower surface of said fibrous mat. 10

5. The underlayment membrane of claim 4 wherein said release coating includes a talc/polymer coating.

6. The underlayment membrane of claim 1 wherein said split facer sheet is comprised of a polymeric substrate disposed as a coating on said rubberized asphalt coating provided on said fibrous mat. 15

7. The underlayment membrane of claim 6 wherein each of said plurality of spaced apart and distinct traction surface regions applied to the material substrate of the split facer sheet is comprised by a polymer blend including a mixture of low molecular weight polyethylene and amorphous polyolefin. 20

8. The underlayment membrane of claim 1 wherein the fibrous mat includes fibers selected from the group consisting of polyesters, polypropylenes and fiberglass. 25

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