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(54) **PROCESS FOR COATING MODIFIED BITUMEN MEMBRANES USING REFLECTIVE LAMINATE COATINGS**

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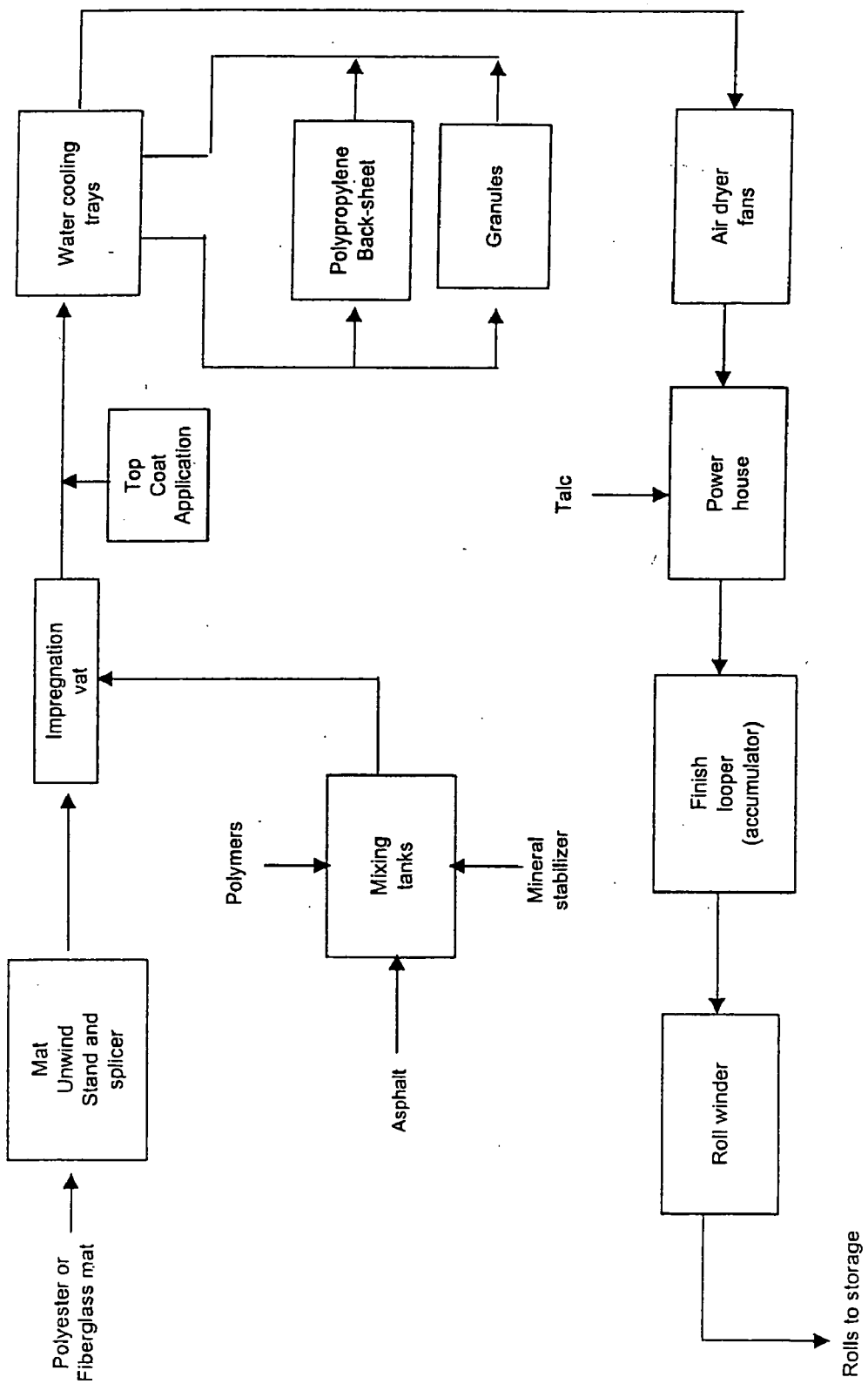
(57) **ABSTRACT**

A method of applying a laminate composition containing a whitening pigment during manufacture of modified bitumen roll roofing membranes, is provided. The laminate composition is heat activated providing greater adherence to surfaces that it applied to, and greater reflective properties. The laminate has an initial energy efficiency rating greater than or equal to 0.65 for a low-sloped roof, or an initial energy efficiency greater than or equal to 0.25 for a steep-sloped roof.


Polyester or Fiberglass mat
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Impregnation vat
Water cooling trays
Top Coat Application
Polymers
Mixing tanks
Asphalt
Mineral stabilizer
Polypropylene Back-sheet
Granules
Talc
Power house
Air dryer fans
Finish looper (accumulator)
Roll winder
Rolls to storage

Figure 1

PROCESS FOR COATING MODIFIED BITUMEN MEMBRANES USING REFLECTIVE LAMINATE COATINGS

[0001] The present invention relates to a new and useful laminate composition and a method for applying the laminate, and more specifically, to a reflective laminate film composition for roll roofing products that is applied during the manufacturing process.

BACKGROUND OF THE INVENTION

[0002] Modified bitumens were developed in Europe during the late 1960's for roofing applications and found a market in the United States during the 1980's. These products are an important part of the roofing industry and are produced as a continuous sheet on a roofing line and are later cut down to individual pieces and wound in rolls of various lengths. Subsequent to laying on a roof, they are top coated with coatings that provide energy efficacy and reflectivity.

[0003] With prior art white reflective coatings problems have occurred in maintaining roof surface reflectivity. Reflectivity decreases the most during the first year of a roof's life. After three years, the rate that reflectivity declines is typically less significant. Changes in reflectivity are primarily related to changes with the coating itself (e.g., coating erosion or cracking) and/or minimally related to accumulation of particulate matter (e.g., dirt) from atmospheric fallout. Depending on the geographic exposure and how well roof surfaces drain, keeping roof surfaces white and preventing premature failure from cracking and peeling can be a significant challenge and result in major maintenance expenditures for owners. Maintaining reflectivity may involve regular cleaning, regular restoration of reflective coatings, and regular application of biocides and/or fungicides. There remains a need for improved coatings with greater reflectivity, energy efficacy and durability.

[0004] Prior art coatings are applied directly to granule-surfaced modified bitumen roof membranes on new roof systems or as restorative coatings. Examples of such coatings are found in U.S. Pat. No. 6,060,555. However, granules are difficult to coat because of their rough, uneven surface areas. Moisture and air pockets can be trapped under the coating and lead to blisters or pinholes in the cured coating. Consequently, application of a compatible primer to the granule surface before coating application is required. Inconsistent coverage and potential cracking of areas where the coating is applied too heavily are additional problems related to application of previous coatings. Hence, there is a need for a method for top coating application that consistently results in uniform thicknesses of the coating.

[0005] Prior art coatings require application to the roofing membrane subsequent to placement of the modified bitumen membranes. Most coatings are recommended to be applied a few days, and sometimes as much as 60 days later on AAP modified products, after installation of the roofing membrane, which extends the time needed for prompt completion of the roofing project. Application requires special equipment such as a pressure washer, paddle mixer and spray rig as well as personal protective equipment. Pressure washing removes embedded dirt, chalking, carbon black and poorly adhered material. A paddle mixer is required as the coating must be completely stirred to ensure proper polymer dispersion because the solids may have settled at a container's bottom. Hence, there is a need for coating compositions that can be easily and effectively applied without the need for special equipment.

[0006] Certain coatings, such as acrylic coatings develop strength and adhesion as they cure during installation. When an acrylic coating is applied, two physical changes must occur: water must evaporate from the applied coating film for initial drying and acrylic polymers must fuse together for final cure. Consequently, for application purposes multiple thin coats promote water evaporation, polymer dispersion, and help eliminate pinholes, voids or thin spots.

[0007] Application of water-based acrylic coatings is influenced by changing weather conditions. Virtually all parts of North America have some application limitations as a result of cold weather, daily rainstorms, high humidity and/or fog, or reduced daylight hours during winter. Rain on an uncured coating will cause a partial or total coating run-off. Problems occur when an acrylic coating is specified on a construction project without regard to the time of year the coating is to be installed.

[0008] Additionally, two or more successive coats of the coating are often necessary. Further, the drying of the coating is influenced by weather conditions. Cold temperatures and lack of sunlight decrease the freshly applied coating's evaporation. Water in the coating film closest to the membrane diffuses through slowly. Coatings exposed to water conditions during the drying or coating period may soften, lift and debond from the surface. This often requires cleaning of the surface and reapplication of the coating. The final cure takes place during the first few weeks after application and is essential to the coating's long term performance. Wet weather and cooler temperatures inhibit final cure and may inhibit proper fusing. Consequently, acrylic coating applications cannot be attempted on roofing projects from late fall to early spring in most North American areas.

[0009] Film laminate coatings cannot be directly applied to asphaltic compounds because of inter alia difficulties due to heat sensitivities of the film, potential for delamination of the film caused by exudation of oil from modified bitumen membranes, and discoloration of the film due to exudation of oil. U.S. Pat. No. 5,096,759 discloses a membrane containing a laminated top aluminum foil surface and a bottom bitumen coating surface. However, foil materials typically have very smooth surfaces, which may provide insufficient surface area for binding, and therefore could delaminate from the surface of the asphaltic compound after cooling of the roofing membrane. Moreover, use of a thin layer of aluminum can cause the surface film laminate to fail by erosion or damage due to traffic. Conversely, use of a thicker foil increases cost in addition to posing other problems such as the product becomes very rigid and difficult to handle. Importantly, foil will not meet Energy Star® requirements.

[0010] Hence, there is a need for new and improved laminated coating compositions that may be applied in-plant during manufacture of the roll roofing membrane. In particular, a coating composition is needed that is reflective, energy efficient (meeting today's Energy Star® criteria) as well as durable and easy to apply, and which is not vulnerable to the effects of moisture and cold temperatures during the curing process.

SUMMARY OF THE INVENTION

[0011] The present invention provides an improved laminate composition for use in roofing products that provides energy efficacy, greater reflectivity, greater adherence, and a method of manufacture whereby the coating is applied during manufacture of the roll roofing membranes. The reflectivity provided by the inventive laminate composition, meets today's Energy Star® standards. Additionally, the roofing product produced is flexible enough to allow the product to be rolled without cracking, yet is sufficiently puncture and scuff resistant to adequately protect the laminate.

[0012] The roof coating of the invention is a white reflective laminate that adheres well to various roof substrates, particularly modified bitumen membranes and remains adhered even under severe water-ponding conditions.

[0013] The method of the present invention involves applying the laminate that is adhered to roofing membranes during the manufacture of the roof membrane obtained via the extrusion processes to the roll roofing membrane while it is still hot exiting the formation line where it is produced, resulting in heat activated curing and adhesion to the membrane.

[0014] The method of the present invention results in application of a laminate of appropriate and uniform thickness.

[0015] The resulting coated roof has an initial solar reflectance and a maintained solar reflectance that meets today's Energy Star® criteria. The resulting coated roof of the present invention achieves greater reflectivity than that achievable with coatings applied subsequent to placement of the membranes on site.

[0016] The energy efficacy of the laminate is determined by its solar reflectance. Solar reflectance by definition is the fraction of solar flux reflected by a surface expressed as a percent or within the range of 0.00 and 1.00.

[0017] The laminate composition of the present invention comprises a dispersion of plastic resins and a pigment. Plastic resin coatings have traditionally been used as a food wrap prepared by extrusion processes. It has surprising been discovered that this laminate is useful for modified bitumen membranes. The roofing products thus produced in accordance with the present invention will possess greater reflectivity, adherence and durability.

[0018] The present invention is also related to the film, i.e. top coat, that is formed from the top coating composition of the present invention as well as roofing products that are coated with the same.

[0019] The laminate of the present invention is applied in-plant during manufacture of the roll roofing membranes in order to achieve a higher reflectivity. Application in-plant results in greater strength and adhesion to the roofing membrane. Application in-plant also results in coating of modified bitumen membranes with ease and maximum efficacy.

BRIEF DESCRIPTION OF THE DRAWING

[0020] **FIG. 1** is a flow diagram of the production of the laminated modified bitumen membrane of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0021] As indicated above, the present invention provides laminate compositions for roofing products that provides energy efficacy, durable exterior protection, is highly reflective to solar energy, and which is applied during the manufacture of the roll roofing membrane. The highly reflective nature of the laminate composition of the present invention provides a solar reflective coating that minimizes energy expended in air conditioning and levels temperature within a building structure.

[0022] The laminate coating is applied to the roll roofing membrane and heat melted during the manufacture of the roll roofing membranes. The heat of the roof membrane activates the coating to coagulate and bond to the underlying membrane. The coated membrane thus produced is allowed to cure during the manufacture of the roll roofing membranes. It becomes inseparable with the modified bitumen membranes and is then wound in spiral rolls and cut to appropriate sizes. The invention reduces the time and labor involved with coating application.

[0023] The plastic laminate coating is produced via extrusion processes on an extrusion line. Generally, extrusion involves forcing a viscous material through a die typically comprising an inlet, a cavity, and an exit. The end product of the extrusion process is a sheet comprising a single layer of polymeric material. Alternatively, the coating may be composed of co-extruded layers of a multi-layer sheet. Extrusion and coextrusion processes of the present invention include, but are not limited to, blown bubble extrusion, extrusion casting, profile extrusion, injection molding, extrusion coating and extrusion sheet.

[0024] The inventors have surprisingly found that plastic films traditionally used in the food and household wrap industry are useful as laminate top coatings for modified bituminous membranes. Such plastic films incorporated with pigment have the desired elasticity, processability, mechanical, and reflective properties for top coatings for modified bituminous membranes.

[0025] The manufacture of modified bitumen membranes consists of six major operations: (1) mixing asphalt with either atactic and isotactic polypropylene or styrene-butadiene-styrene and a mineral stabilizer in large heated tanks (356° F.; 180° C.), (2) applying the mixture to a polyester or fiberglass mat-based webbing, (3) applying a polypropylene backing or mineral surfacing (top and bottom), (4) cooling and drying, (5) product finishing (seal-down strip application, cutting and trimming) and, (6) packaging. Step (4), the cooling process occurs by passing the product around water-cooled rollers in a looper arrangement. Usually, water is also sprayed on the surfaces of the sheet to speed the cooling process.

[0026] The coating of the present invention is applied to the modified bitumen membranes as they exit the formulation line and prior to cooling. Modified bitumen membranes as they exit the formulation line are at a temperature between 125° F. and 160° F. (52° C.-72° C.). Cooling occurs in the finished product looper so that the membrane is approximately less than 100° F. (38° C.) at the winder. The total amount of heat to be removed is 2.1 million BTU (0.53 million Kcal per hour). The heat quantity to be removed is

proportional to membrane thickness; thinner membranes can be produced at higher line speeds than thicker membranes.

[0027] According to the present invention, in lieu of spraying with water to cool, the top coat is applied in a single yet efficient application. Via heat fusion or thermosetting the top coating permanently adheres to the membrane. The modified bitumen membrane is then allowed to cool, passed through a finish looper (accumulator) and is wound on a mandrel, cut to the proper length, and packaged. The process is depicted in **FIG. 1**.

[0028] The method of the present invention allows for continuous top coating application for large strip areas of modified bitumen roll roofing. The coating is flexible enough to allow the modified bitumen membrane to be rolled without cracking, sufficiently puncture and scuff resistant to adequately protect the coating.

[0029] The method of the present invention minimizes variations in coating thicknesses and results in application of the top coating in uniform thicknesses. To further insure uniform thickness, the present invention further comprises various speed controls, so that an appropriate thickness can be applied.

[0030] The method of the present invention results in a laminated film coating having a thickness of from about 1 to about 12 mils, more typically form about 1 to about 10 mils.

[0031] The method of the present invention avoids the drawbacks of coating existing bitumen membranes by applying and curing the coatings on site. The method avoids cumbersome transport and storage or the coating on site. No labor for installation and cleanup is required and installation is time efficient.

[0032] The coating composition of the present invention includes a mixture of a laminate of plastic film and a pigment, typically a whitening agent.

[0033] The mixture of the present invention has an initial reflectivity of at least 75% ASTM C1549 or E903 and a solar reflectance of at least 50% after three years exposure.

[0034] Modified bitumen roof systems are defined as polymer-modified bitumen membranes and a base sheet, reinforced with plies of fiberglass, polyester or a combination of both.

[0035] A laminate coating composition is defined as a coating in the form of a laminate that does not use a volatile solvent or water. For the purpose of the present invention, the terms laminate and coating or top coating are used interchangeably throughout.

[0036] The polymer-modified bitumen membrane is modified with a polymer selected from, but not limited to, atactic (amorphous) polypropylene, polypropylene-ethylene copolymers, polyvinyl toluene (PVT), polyethylene, polyoxyethylene, styrene, butadiene-styrene block copolymer (SBS), styrene-ethylene-butylene-styrene block copolymer (SEBS), and styrene-isoprene-styrene block copolymer (SIS).

[0037] Reflectivity is defined as the fraction of radiant energy that is reflected from the white roofing surface. The higher the amount of reflectivity the cooler the roof has the capability of being.

[0038] Wet mil thickness is defined as the amount of coating applied to the roofing substrate equal to one thousandth of an inch while the coating is still hot.

[0039] Extrusion is defined as the process of forming continuous shapes by forcing a molten plastic material through a die, followed by cooling or chemical hardening. Immediately, prior to extrusion through a die, the relatively high-viscosity polymeric material is fed into a rotating screw of variable pitch, which forces it through a die.

[0040] Co-extrusion is defined as the process of extruding two or more materials through a single die with two or more orifices arranged so that the extrudates merge and weld together into a laminar structure before cooling.

[0041] The term "plastics" as used herein should be understood as referring not only to the basic polymer but also such materials in which the basic polymer is mixed with additives improving its properties, particularly plasticizers. The term "plastic" and "plastic resin" are used interchangeably throughout.

[0042] Food wrap films and cling films are widely used in homes, restaurants, supermarkets, etc for food preservation in a refrigerator or freezer, or for cooking in a microwave oven. Known materials of wrap films include biaxially stretched vinylidene chloride resins, polyvinyl chloride, polyvinyl toluene (PVT) and polyethylene resins containing a surface active agent. The formulations of these laminate coatings are those well known to the industry and need not be discussed here.

[0043] The present inventors have surprisingly discovered that plastic laminate topcoats are suitable as top coats for modified bitumen membranes which may be applied in a batch or continuous process.

[0044] The laminate top coating composition has at least one layer comprising a blend of at least one synthetic resin or film, such as, but not limited to, polyvinyl chlorides (PVCs), polyolefins, such as, polyethylene, polypropylene, poly(butylenes), polybutylene and polyethylene terephthalates, polyester, aromatic polyesters, polycarbonate, polyvinyl alcohol, polyvinyl toluene (PVT). acrylic resin, ethylene-vinyl acetate copolymer, chlorinated polyethylene, polyamides, polyimides, polyetherimides, cellulosics, poly(arylate), liquid crystal polymers, blends, alloys of the foregoing resins, polyethers, polycyclopentanes, polymethylpentane and any copolymers thereof.

[0045] As used herein, the term "polyolefin" refers to homopolymer and copolymers of alpha-olefins having from 2 to about 8 carbon atoms, such as high density polyethylene, low density polyethylene, linear low density polyethylene, and polypropylene.

[0046] Of the materials mentioned above, it is preferred to use polyethylene, polypropylene, PVT or PET.

[0047] These materials are made using techniques well-known in the art including, for example, polymerization of at least one monomer in the presence of a suitable polymerization catalyst such as metallocene or Ziegler/Natta catalyst; extrusion molding and cutting.

[0048] Combinations and/or multilayered stacks of such plastic films are also contemplated herein.

[0049] The other component of the inventive top coating composition is a pigment. The pigment employed in the present invention can be any pigment that is capable of providing a highly reflective coating after the resultant mixture is cured. Typically, the pigment provides a coating that is white in color. Various shades of white are also possible as well as other colors that are capable of providing a coating that is highly reflective.

[0050] Suitable pigments that can be employed in the present invention include, but are not limited to: titanium dioxide, calcium carbonate, colemanite, aluminum trihydride (ATH), borate compounds, and mixtures thereof. One highly preferred pigment employed in the present top coating composition is titanium dioxide, which produces a white color. The coating can be formulated in a variety of colors to conform to building aesthetics.

[0051] The pigments are employed in an amount from about 1 to about 20 wt. %, with an amount from about 4 to about 15 wt. % being more typical for one of the aforementioned pigments.

[0052] The ratio of pigment to binder of the coating formulation is in the range of about 1:5 to 1:10, preferably 1:6.5 to 1:8.5.

[0053] The energy efficacy of the coating is determined by measuring its initial solar reflectance using ASTM E903 (Standard test method for solar absorptance, reflectance, and transmission of materials using integrated spheres). Alternatively, the initial solar reflectance can be determined by ASTM C 1549 (Standard test method for determination of solar reflectance near ambient temperature using a portable reflectometer).

[0054] In addition to having the aforementioned initial solar reflectance values, the coating of the present invention needs to be capable of maintaining a solar reflectance for three years after installation on a low-sloped roof under normal conditions of greater than or equal to 0.50 (measured from the first year after installation). For steep-sloped roofing products, the top coating of the present invention has to maintain a solar reflectance for three years after installation under normal conditions of greater than or equal to 0.15 (measured from the first year after installation).

[0055] Maintenance of solar reflectance of a roofing product can be determined using the current guidelines mentioned in the Energy Star® program requirements manual. The test can be carried out using ASTM E 1918 or ASTM C 1549 for low-sloped roofing products. ASTM C 1549 can be used in the case of steep-sloped roofing.

[0056] The coating composition of the present invention, which comprises a mixture of at least the above-mentioned components, may also include other optional components that are typically employed in top coating compositions. For example, the coating composition of the present invention can include any of the following components:

[0057] polymer binders;

[0058] dispersants such as potassium tripolyphosphate, acrylic polymers or copolymers, and the like;

[0059] defoamers that are capable of preventing foaming;

[0060] fillers such as calcium carbonate, talc, white sand, colemanite, and the like;

[0061] solvents that are capable of serving as a coalescing agent such as ethylene glycol, propylene glycol, alcohols, and the like; preferred is ester alcohol which is a slow evaporating, water-insoluble coalescing aid.

[0062] microbiocides that serve as fungicides, e.g., zinc oxide;

[0063] thickening agents such as hydroxethyl cellulose, polyurethane, and the like;

[0064] fire retardants such as alumina trihydrate, zinc borate, alkali metal silicates, and the like;

[0065] polymeric carriers;

[0066] pH modifiers such as aqueous ammonia;

[0067] wetting agents such as siloxanes;

[0068] light stabilizers such as hindered amines; and/or

[0069] adhesion promoters such as hydrocarbon resins

[0070] UV stabilizers.

[0071] The optional components mentioned above are present in the coating composition of the present invention in amounts that are well known to those skilled in the art.

[0072] The laminate of the present invention can also be corona treated to provide greater affinity of the film to attach to the asphalt membrane.

[0073] The coating composition of the present invention is prepared by first providing a laminate dispersion of at least the synthetic resin or film, the pigment and the other optional ingredients in an extruder and led to a die. Mixing occurs via melt-kneading in the extruder.

[0074] The mixing provides a laminate blend of components that can be applied immediately to a surface of a building materials product or the resultant mixture can be stored for several weeks or month prior to application.

[0075] The laminate blend can be applied in a batch or continuous process. In a batch process, the modified bitumen membrane is stationary during each treatment step of the process, whereas in a continuous process the modified bitumen membrane is in continuous movement along an assembly line. The present invention will now be discussed generally in the context of laminating a modified bitumen membrane along an assembly line process, although the process is also useful for laminating roofing membranes in a batch process.

[0076] The resultant laminate composition of the present invention can be applied to any substrate, especially roofing products or other related building materials products, by side extrusion coating, spray coating, dip coating, knife coating, roll coating or a film application such as lamination/heat pressing and other like coating procedures. The top coating composition may also be bonded to the modified bitumen membranes by chemical bonding, mechanical bonding and/

or thermal bonding. Each of the above-mentioned methods are well known to those skilled in the art; therefore a detailed description concerning the specifics of the methods are not needed herein.

[0077] After applying the coating composition of the present invention to a surface of a substrate, the coating composition is cured at the temperature of the environment in which the coated substrate is located. Curing can take place in just a few minutes or longer depending on the thickness of the applied coating as well as the environmental temperature.

[0078] The coating composition of the present invention is generally applied to the exterior surface of a substrate. In particular, the coating composition is generally applied to an expose exterior surface of a roofing product including low-sloped roofing products such as single ply membranes, built-up roofing (BUR), modified bitumen, ethylene propylene diene monomer (EPDM) rubber and standing-seam profile metal roofing, or steep sloped roofing products such as composite shingles, clay, concentrate, fiber cement tile, slate, shakes, architectural profiled metal and individual roofing components. In some preferred applications, the coating composition of the present invention is applied to BUR surfaces, modified bitumen and EPDM rubber.

[0079] After application and curing, a laminate is provided to the substrate that provides durable protection to the substrate from abrasion, impact, water, and other environmental factors. Moreover, the laminate provided by the present invention is capable of extending the lifetime of the current roofing system. The top coat provided in the present invention is also breathable meaning that it has excellent porosity, which allows for venting of vapors.

[0080] In addition to the foregoing properties, the laminate that is formed using the inventive composition has a high reflectivity that meets and even may exceed current Energy Star® values.

[0081] While the laminate of the present invention is directed to modified bitumen roof membranes, such as APP and SBS polymer modified bitumens, it is understood that it may be applied to other roof systems such as, but not limited to, granule- and mineral-surfaced modified bitumen cap sheets, metal roof systems, masonry surfaces, build-up roof (BUR) systems (BUR systems consist of bitumen and ply sheets applied in multiple layers, hence the term "built-up"), EPDM, PVC, Hypalon® and substrates such as spray polyurethane foam (SPF).

[0082] The coating can be applied in a laminate state at a specified application rate which results in a coating thickness of between about 0.5 to about 12 mils; more typically from about 1 to about 10 mils. For all application purposes, the laminate can be applied in two or more thin coats or one thick coat.

[0083] The coating may be applied by spray, brush or roller. According to the present invention, spraying is preferred. The use of spray equipment comprises: a source means for providing a supply of the laminate coating; a pump means for pumping such coating; and a spray means for spraying such coating. A spray pump capable of developing 1,800-psi material output pressure should be sufficient to spray the coating of the present invention. Alternatively, hydraulic or pneumatic pumps may be used.

[0084] The coating of the present invention may be used with or without surface priming.

[0085] The coating of the present invention is applied to the modified bitumen roll roofing membrane during manufacture. Alternatively, the coating may be applied to the roof and cured in situ or "manufactured in place.

[0086] While the invention has been described for use in roofing materials, it is also usable for coating applications on siding or at ground level such as for pavement painting or sealing applications.

EXAMPLE 1

[0087] The asphalt is heated to approximately 400° F. Polymer is added and high shear mixed. Fillers are added under low shear. The asphalt compound thus made undergoes Quality Control approval. It is then pumped to the production line. The asphalt compound is saturated in reinforcement. The film laminate is adhered at approximately 230° F. The combination is cooled under water, dried and rolled up in 100 square feet.

[0088] While the present invention has been particularly shown and described with respect to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in forms and details may be made without departing from the spirit and scope of the present invention. It is therefore intended that the present invention not be limited to the exact forms and details described and illustrated but fall within the scope of the appended claims.

1. A method of coating a modified bitumen roll roofing membrane in-plant comprising the steps of:

(a) applying a layer of a reflective laminate upon a surface of a modified bitumen roll roofing membrane exiting from a formation line;

(b) permitting said reflective laminate to heat activate; and

(c) allowing the laminate to cure and adhere to said surface.

2. The method of claim 1 further comprising applying two or more layers of reflective laminate therein over said modified bitumen roll roofing membrane.

3. The method of claim 1 wherein the applying includes die extrusion, air spraying, dip coating, knife coating, roll coating or a film application.

4. The method of claim 1 wherein the applying comprises lamination.

5. A method for improving adhesion between a reflective laminate and a modified bitumen membrane, which method comprises:

(a) treating a surface of a modified bitumen roll roofing membrane with a reflective laminate while said membrane is still hot exiting the formation line during manufacture;

(b) permitting said reflective laminate to heat activate; and

(c) allowing the laminate to cure and adhere to the surface.

6. A method for improving reflectivity of a roof coating, which method comprises:

(a) treating a surface of a modified bitumen roll roofing membrane with a reflective laminate while said membrane is still hot exiting the formation line during manufacture;

(b) permitting said laminate to heat activate; and

(c) allowing the laminate to cure and adhere to the surface.

7. A highly reflective laminate composition comprising:

a laminate that has an initial energy efficacy rating greater than or equal to 0.65 for a low-sloped roof, or an initial energy efficacy greater than or equal to 0.25 for a steep-sloped roof; wherein said laminate adheres to roll roofing membranes by heat activation during manufacturing.

8. The laminate composition of claim 7 wherein said roll roofing membrane is a polymer-modified bitumen membrane.

9. The laminate composition of claim 8 wherein said polymer-modified bitumen membrane is modified with a polymer selected from the group consisting of atactic polypropylene, polypropylene-ethylene copolymers, polyvinyl toluene, polyethylene, polyoxyethylene, styrene, butadiene-styrene block copolymer, styrene-ethylene-butylene-styrene block copolymer, and styrene-isoprene-styrene block copolymer.

10. The laminate composition of claim 7, wherein the coating is a plastic wrap laminate blended with a pigment, whereby said laminate reflects radiant energy.

11. The laminate composition of claim 7, wherein the coating is a synthetic resin or film.

12. The laminate composition of claim 7, having at least one layer comprising a blend of:

(a) at least one synthetic resin or film selected from the group consisting of, polyvinyl chlorides, polyolefins, polybutylene and polyethylene terephthalates, polyester, aromatic polyesters, polycarbonate, polyvinyl alcohol, polyvinyl toluene, acrylic resin, ethylene-vinyl acetate copolymer, chlorinated polyethylene, polyamides, polyimides, polyetherimides, cellulosics, poly(arylate), liquid crystal polymers, blends, alloys of the foregoing resins, polyethers, polycyclopentanes, polymethylpentane and copolymers thereof; and

(b) at least one pigment.

13. The laminate composition of claim 12 wherein the pigment is a whitening agent.

14. The laminate composition of the claim 13 wherein the whitening agent is titanium dioxide.

15. The laminate composition of claim 12, having at least one layer comprising a blend—of:

(a) at least one synthetic resin or film selected from the group consisting of polyethylene, polypropylene, PVT and PET; and

(b) at least one whitening pigment.

16. A laminated modified bituminous membrane coated with the laminate composition of claim 12.

17. A laminate modified bituminous membrane coated with the laminate of claim 12 to a thickness of 1-10 mils.

18. The laminate modified bituminous membrane of claim 12 further comprising additional ingredients selected from the group consisting of dispersants, defoamers, fillers, solvents, coalescing aids, microbiocides, thickening agents, fire retardants, pH modifiers, wetting agents, polymeric binders, polymeric carriers, light stabilizers, adhesion promoters, and UV stabilizers.

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