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(54) Masonry-bondable membranes, their manufacture and use
An Mauerwerk haftfähige Membranen, ihre Herstellung und ihre Verwendung
Membranes reliance pour maçonnerie, leur fabrication et leur usage

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Description

The present invention relates to an anti-fracture, water-resistant, masonry bondable membrane having a flexible central layer and a layer of nonwoven fibres physically bonded to each side thereof.

BACKGROUND

Hitherto, various membranes have been utilized between an exterior masonry article such as ceramic tile or marble and a masonry substrate such as concrete or stone to form a water-resistant barrier as well as a flexible layer which prevents cracks in the substrate from propagating into the article. Such a particular membrane contained an exterior, nonwoven, fiber material which was chemically bonded to a polyvinyl chloride intermediate layer on each side thereof by an adhesive. Such a lamina had poor hydrostatic water resistance and generally poor bondability to masonry bonding materials such as mortar or cement. Delamination would thus readily occur between the membrane and the masonry bonding material.

GB-A-2115747 discloses a membrane, including a sheet of plastics foam bonded by heat to a fabric film, the membrane being designed to bear a coating such as paint or upholstery.


According to one aspect the present invention provides a water-resistant, masonry-bondable membrane comprising:

a lamina having a central layer comprising at least one ply of a flexible material, and a nonwoven fibre layer directly physically bonded to each side of said central layer, characterised in that the flexible material is polyvinyl chloride or a vinyl chloride copolymer, having from 35 to 55 parts of plasticiser per 100 parts by weight of said polymer.

Other aspects are set out in the claims.

A flexible, anti-fracture, water resistant membrane comprises a lamina containing a central layer of a flexible material which is physically bonded on each side to a layer of non-woven fibres. Such a lamina can be made relatively thin, but with good hydrostatic water resistance and good bonding to masonry bonding materials. Such a lamina may be made by laminating a nonwoven fibre layer to a layer of a flexible material through the application of heat and pressure, and subsequently laminating two aforesaid laminates together by heat and pressure, with the resultant lamina containing the two flexible layers fused to one another. When utilized as an intermediate membrane in a thin-set application, e.g., ceramic tile bonded to a masonry substrate, the membrane is effective in forming a water or moisture barrier as well as preventing the propagation of cracks from the substrate to the tile, and the nonwoven layers which have fibers protruding therefrom result in enhanced adhesion with the substrate and the tile.

BRIEF DESCRIPTION OF DRAWING

FIG. 1 is a cross-sectional view of a lamina embodying the invention wherein a flexible polymer physically bonded to a layer of nonwoven fibers is fuse-bonded to a similar flexible polymer which is also physically bonded to a layer of nonwoven fibers.

FIG. 2 is a cross-sectional view showing a ceramic tile indirectly bonded by mortar, through a flexible membrane lamina embodying the invention to a concrete substrate.

DETAILED DESCRIPTION

A membrane embodying the invention is shown in FIG. 1 wherein like reference characters indicate like parts. The membrane, generally indicated by the numeral 10, is a lamina generally containing a flexible layer 12 in the form of a sheet or film. Layer 12 acts as a barrier to water and is capable of undergoing heat fusion with a nonwoven fiber layer.

As a material for the layer 12, plasticized polyvinyl chloride may be used. Optionally, a preferred flexible polymer is a copolymer made from vinyl chloride monomers and small amounts of comonomers such as esters of acrylic acid wherein the ester portion has from 1 to 12 carbon atoms, for example, methyl acrylate, ethyl acrylate, butyl acrylate, octyl acrylate, cyanoethyl acrylate, and the like; vinyl acetate; esters of methacrylic acid wherein the ester portion has from 1 to 12 carbon atoms, such as methyl methacrylate, ethyl methacrylate, butyl methacrylate, and the like; styrene and styrene derivatives having a total of from 8 to 15 carbon atoms such as alpha-methylstyrene, vinyl toluene, or chlorostyrene; vinyl naphthalene; diolefins having a total of from 4 to 8 carbon atoms such as butadiene, isoprene, and including halogenated diolefins such as chloroprene or monoolefins having from 2 to 10 carbon atoms and preferably 2 to 4 carbon atoms; and mixtures of any of the above. The amount of the comonomer is generally up to about 30 per-
cent by weight and desirably up to 20 percent by weight.

Regardless of whether polyvinyl chloride homopolymer or copolymer is used, the inherent viscosity thereof according to ASTM-D-1240-60, Method A, in cyclohexane at 20°C, is generally from about 0.85 to about 1.10, and preferably from about 0.90 to about 0.96.

When the continuous flexible material layer is a polymer, it can contain conventional additives in conventional amounts, such as processing aids, mildew-resistant compounds, light and heat processing stabilizers such as epoxidized soybean oil, lubricants such as stearic acid, flame retardants, pigments, and the like.

When the flexible layer is the preferred homopolymer of vinyl chloride or a copolymer thereof, it is particularly preferred for present purposes that less than conventional amounts of plasticizer be utilized in order to obtain desirable physical properties such as those set forth below. Examples of conventional plasticizers include various phthalates, e.g., dioctyl phthalate, diisononyl phthalate, disodecyl phthalate, as well as various terephthalates. The amount of plasticizer used herein is usually 65 parts or less, desirably from about 35 to about 55 parts, and preferably from about 40 to about 50 parts by weight per 100 parts by weight of the vinyl chloride homopolymer or copolymer resin.

Regardless of whether a vinyl chloride homopolymer or copolymer is used, the inherent viscosity thereof according to ASTM-D-1240-60, Method A, in cyclohexane at 20°C, is generally from about 0.85 to about 1.10, and preferably from about 0.90 to about 0.96.

The thickness of the flexible layer 12 is generally from about 12.5 mils to about 25 mils (from about 0.318 to about 0.635 millimeters), desirably from about 14 to about 22 mils (from about 0.356 to about 0.559 millimeters), and preferably from about 15 to about 20 mils (from about 0.381 to about 0.508 millimeters).

Nonwoven fiber layer 14, desirable in the form of a mat, is attached to flexible polymer layer 12. More specifically, nonwoven layer 14 is physically bonded to the flexible layer through the application of pressure and heat. The process of physically laminating the two layers together involves pressing the two layers or sheets together e.g. through the use of a calender roll or other appropriate laminating apparatus at a pressure of from about 125 to about 450 (from about 2,232 to about 8,036) desirably from about 135 to about 350 (from about 2,411 to 6,250), and preferably from about 150 to about 200 pounds per linear inch (from about 2,679 to about 3,572 kilograms per linear meter). Suitable temperature conditions, e.g. heating of the calender rolls, are from about 280°F to about 350°F (from about 138°C to about 177°C), desirably from about 300°F to about 350°F (from about 149°C to about 186°C), and preferably from about 300°F to about 320°F (from about 149°C to about 160°C). The flexible material such as a polymer and/or the nonwoven layer can optionally be preheated to approximately the same temperatures. Such temperatures are generally above the softening point of the flexible material, e.g., a polymer, but below the melting point thereof. An alternate laminating method is extruding the flexible material and subsequently running it through a nip roll with the nonwoven layer to form the twoply laminate. Generally, the flexible material fed to the laminating apparatus exists at an elevated temperature e.g. from about 270°F to about 350°F (from about 132°C to about 177°C) inasmuch as it is usually generally fed directly from a Banbury or an extruder, etc., to the laminating apparatus and is soft. Regardless of the particular type of laminating apparatus utilized, the nonwoven layer is partially pressed into the soft, flexible material and is thus mechanically bonded thereto. No chemical bond, as generated by a chemical reaction, is needed and typically none exists. A separate adhesive need not be used. It is important that the nonwoven layer be only partially embedded in the flexible polymer layer so that the remaining portion thereof still possesses outward protruding fibers or a rough surface, and can form an effective bond, i.e., be adhered, to a masonry bonding material. The amount of fibers embedded is generally at least about 20 percent, desirably at least about 30 percent, and preferably at least about 40 percent by volume. Conversely, the embedded volume percentage is generally less than about 80, desirably less than about 70 and preferably less than about 60 percent.

Nonwoven fiber layer 14 can be generally any type of synthetic nonwoven material with specific examples including polypropylene, polyester, and nylon, and the like, with polyester such as polyethylene phthalate being preferred. The thickness of the nonwoven layer is generally from about 2 to about 6 mils (from about 0.051 to about 0.152 millimeters), desirably from about 3 to about 5 mils (from 0.076 to about 0.127 millimeters), with from about 4 to about 5 mils (from about 0.102 to about 0.127 millimeters) being preferred. Suitable materials are known to the person skilled in this art.

Optionally, a second nonwoven fiber layer as described above can be laminated and physically bonded to the remaining side of the flexible layer such that the resulting lamina contains only one central flexible layer. The process and apparatus for forming such a lamina as well as the various layers thereof can be as set forth above, but the thickness of a single-ply flexible layer is generally twice that mentioned above so that the formed membrane has suitable physical properties such as hydrostatic or water burst resistance, modulus, and tensile strength, with regard to its intended end use. That is, more generally applicable values for total thickness of the central layer can be obtained by doubling the values given above.

A preferred form of membrane embodying the invention is shown in Fig. 1, wherein another or second nonwoven fiber layer 24 is physically bonded to another or second flexible layer 22. Nonwoven fiber layer 24 can be the same as or different from nonwoven layer 14 and flexible polymer layer 22 can be the same material or a different material from flexible layer 12 and each layer can be made of any of the types of materials described hereinabove. Once a second flexible layer 22 having a physically bonded nonwoven layer 24 has been made under heat and pressure in a manner
as set forth above, the two articles can be dual-laminated to form the preferred four-ply, anti-fracture, water-resistant membrane. The dual laminating process may use conventional laminating equipment such as a calender roll, with the flexible materials of each article being heated and subsequently fused together under pressure and heat. Suitable pre-heat temperatures of each layer 12 and 22, independently, are from about 250°F to about 350°F (from about 121°C to about 177°C) and desirably from about 280°F to about 300°F (from about 138°C to about 149°C). The temperature, e.g. of the laminating calender roll, is generally from about 260° to about 320°F (from about 127°C to about 160°C), desirably from about 275° to about 310°F (from about 135°C to about 154°C), and preferably from about 290°F to about 300°F (from about 143°C to about 149°C), with the pressure exerted on each dual-ply component or article being from about 180 to about 450 (from about 3,214 to about 8,036), desirably from about 200 to about 400 (from about 3,572 to about 7,143) and preferably from about 225 to about 350 pounds per linear inch (from about 4,018 to about 6,250 kilograms per linear meter).

An advantage of the dual lamination step is that when flexible layers 12 and 22 are polyvinyl chloride, they often inherently contain pinholes therein and the heat-fusing of one layer to the other eliminates such pinholes and thus significantly decreases, and may eliminate, the penetration of water or vapor therethrough. The peel strength of the one polymer layer to the second polymer layer is generally from about 2 to about 6.5 pounds per linear inch (from about 36 to about 116) and preferably from about 4 to about 6 pounds per linear inch (from about 71 to about 107 kilograms per linear meter). The physical bond between the nonwoven fiber layer and its associated flexible polymer layer is typically stronger than that between the fused polymer bond layers 12 and 22.

Because of its good physical properties, the four-ply lamina described herein, containing two central layers of a flexible material, is suitable for use as a flexible membrane located between an article which is to be bonded to a masonry substrate. For example, the above-described lamina of FIG. 1 desirably has a hydrostatic or water burst resistance of at least 100 pounds per square inch (6.894 x 10^5 newtons/square meter) a 150 percent modulus of from about 1,200 to about 1,800 or 2,000 pounds per square inch (from about 82.728 x 10^5 to about 137.88 x 10^5 newtons/square meter) and desirably from about 1,400 to about 1,600 psi (from about 96.516 x 10^5 to about 110.304 x 10^5 newtons/square meter).

FIG. 2 shows such a lamina 10 used as an anti-fracture, water-resistant membrane in a masonry environment or construction. Specifically, exterior article 30 is indirectly bonded via the lamina 10 of the present invention to a masonry substrate 40. The exterior article 30 is generally a thin-set article of masonry construction, that is, brick, ceramic tile, marble, stone, or the like. The exterior article 30 is typically bonded to the membrane lamina through the use of a masonry bonding material 50 such as mortar, cement, or the like. Because the nonwoven fiber layer 24 is physically bonded and thus partially embedded in flexible bonding layer 22, but still has a substantial portion thereof residing upon the surface of the polymer layer so as to present outwardly protruding fibers or a rough surface, a strong bond is formed between the lamina and the masonry bonding material. Such a bond generally has the advantage of the absence of (i.e., is free from) any delamination of the nonwoven layer 24. Similarly, the remaining nonwoven layer 14 is bonded through the use of a masonry bonding material 50 to masonry substrate 40 which can be concrete, stone, or the like. The net result is a flexible membrane inner liner which provides good water resistance or impermeability to the exterior article of the masonry construction, as well as water burst resistance and, more importantly, effective crack propagation resistance. That is, should substrate 40 crack due to settling etc., the existence of the flexible membrane inner liner 10 will absorb the stress and/or strain created by the height and/or width created by the crack and significantly retard, if not eliminate, propagation of the same to the exterior masonry article such as a ceramic tile.

While the above embodiments illustrate the concept with regard to a specific lamina and utilization thereof, it is to be understood that more than a four-ply lamina or a lamina containing a different arrangement of layers from that set forth in FIG. 1 can be utilized in a masonry construction, as shown in FIG. 2, or in a different construction.

A lamina as taught herein, containing a single or dual center layer, has been found to be very effective for the applications set forth immediately below. Desirably it has a break strength in the machine direction (i.e., calender) of at least 50 pounds and up to about 75 pounds, preferably from about 55 to about 65 pounds (from 23 to 34 kilograms and preferably from 25 to 29 kilograms), and in the cross-direction from about 40 to about 60 pounds and preferably from about 45 to about 55 pounds (from about 18 to about 27 kilograms and preferably from about 20 to about 25 kilograms). The tensile strength in the machine direction may be at least 1,100 psi to about 1,800 psi (at least 76 x 10^5 to about 124 x 10^5 newtons per square meter), and preferably at least 1,400 to about 1,600 (at least about 96 x 10^5 to about 110 x 10^5 newtons per square meter). The crack resistance may be 25°F or lower (minus 4°C or lower) and preferably 10°F or lower (minus 12°C or lower), according to the standard Masland Impact test as used in the Example. The maximum shrinkage of the lamina is desirably 5 percent with 3 percent or less being preferred.

The present concept is suitable for use in shopping centers and malls, patios, basement floors, cementitious backer boards, and the like wherever thin-set exterior masonry articles such as ceramic tiles, marble, and the like are to be applied via an anti-fracture, water-resistant membrane to a masonry substrate.

The invention can be more fully understood and appreciated by reference to the following example which serves to illustrate, but is not intended to limit, the invention.
EXAMPLE

A pair of identical two-ply lamina were formed by physically bonding a nonwoven fiber layer to a plasticized polyvinyl chloride layer by calendering the two layers at a temperature of about 300°F (149°C) and at a pressure of about 180 pounds per linear inch (3,214 kilograms per linear meter). A four-ply membrane having a pair of polyvinyl chloride layers which are fused together to form the inner layers and a pair of nonwoven fiber outer layers physically bonded to each of the polyvinyl chloride layers was formed by dual laminating the pair of identical two-ply lamina. The four-ply membrane was formed by placing the pair of identical two-ply lamina in overlaying relationship with the polyvinyl chloride layers of each two-ply lamina facing and abutting one another and passing the overlaying pair of two-ply lamina through a pair of calendering rollers at a temperature of about 300°F (149°C) and at a pressure of about 275 pounds per linear inch (4,911 kilograms per linear meter). The polyvinyl chloride layers were The BFGoodrich Company Geon® vinyl homopolymer having an intrinsic viscosity of approximately 0.93. Each of the two polyvinyl chloride layers had an average thickness of about 17 mils (0.43 millimeters) so that the total thickness of the polyvinyl chloride layers of the four-ply membrane was about 34 mils (0.86 millimeters). The nonwoven fiber layer was made of polyester (polyethylene terephthalate) fibers and had a thickness of about 4 mils (0.102 millimeters). The polyester was manufactured by Reemay Company with 4-denier fibers and weighed 1.25 ounces per square yard.

Various properties of the resulting four-ply membrane were measured. The results and the methods used are listed in Table I.

The results show that a strong, relatively thin, lightweight, water-resistant membrane having good tear resistance, dimensional stability, cold crack resistance, burst resistance and mildew resistance properties has been provided.
<table>
<thead>
<tr>
<th>TEST NAME</th>
<th>TEST METHOD</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Weight</td>
<td>ASTM-D751</td>
<td>1.06 kg/m² (31.3 O.z. per Sq. Yd.) ± 0.1 kg (3 oz.)</td>
</tr>
<tr>
<td>Thickness</td>
<td>ASTM-D751</td>
<td>1.07 x 10⁻²m (0.042 in.) Avg. Std. Dev. = 2.20 x 10⁻¹ m (0.0009 in.)</td>
</tr>
<tr>
<td>Peel Strength (Adhesion) Vinyl (Layer 12) to Vinyl (Layer 22)</td>
<td>ASTM D–751</td>
<td>875 N/m (5.0 lb./in.) Avg., 613–1140 N/m (3.5–6.5 lb./in.) range</td>
</tr>
<tr>
<td>Peel Strength (Adhesion) Fabric (Layer 14) to Vinyl (Layer 12)</td>
<td>ASTM D–751</td>
<td>Internal bonding of vinyl later 12 to vinyl layer 22 is less than the bonding strength between fabric 14 and vinyl 12 or fabric 24 and vinyl 22.</td>
</tr>
<tr>
<td>Breaking Strength = (1&quot; strip tensile)</td>
<td>ASTM D–751</td>
<td>Machine Direction = 280N (62 avg. lb.) force std. dev. = 13.8N (3.1 lb.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cross machine = 222N (50 avg. lb.) force std. dev. = 16.7N (3.76 lbs).</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>ASTM D–882</td>
<td>Machine direction = 1.036 x 10⁵ Nm⁻¹ (1502 avg. Ps) std. dev. = 0.56 x 10⁻¹ Nm⁻¹ (81.1 lb.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cross machine = 7.826 x 10⁴ Nm⁻¹ (1135 Avg. psi) std. dev. = 0.63 x 10⁻¹ Nm⁻¹ (91 lb.)</td>
</tr>
<tr>
<td>Trapezoid Tear lb.</td>
<td>ASTM D–751</td>
<td>Machine direction = 280N (63 lb.) Avg. Std. Dev. = 22N (5.0 lb.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cross machine = 276 N (62 lb.) Avg. Std. Dev. = 32N (7.2 lb.)</td>
</tr>
<tr>
<td>Dimensional Stability 1–1/2 minutes in Boiling Water</td>
<td></td>
<td>Machine direction = 3% shrinkage avg.</td>
</tr>
<tr>
<td>Cold Crack Resistance Masland Impact</td>
<td>ASTM D–1790</td>
<td>Cross machine = + 1.3% growth avg.</td>
</tr>
<tr>
<td>Burst Resistance</td>
<td>FTMS–191 A Method 5512 (Hydrostatic Pressure)</td>
<td>0.834 x 10⁶ Nm⁻² (121 psi) avg. Std. Dev. = 0.034 x 10⁶ Nm⁻² (4.9 psi)</td>
</tr>
<tr>
<td>Mildew Resistance</td>
<td>Pink Stain Test</td>
<td>Clear zone of inhibition</td>
</tr>
</tbody>
</table>
a lamina (10) having a central layer comprising at least one ply (12, 22) of a flexible material, and a nonwoven fibre layer (14, 24) directly physically bonded to each face of said central layer, characterised in that the flexible material is polyvinyl chloride or a vinyl chloride copolymer, having from 35 to 55 parts of plasticiser per 100 parts by weight of said polymer.

2. A membrane according to claim 1 in which the central layer comprises two plies (12, 22) bonded together face to face.

3. A membrane according to claim 2 in which the two plies (12, 22) are both of said flexible material and are heat-fused together.

4. A membrane according to claim 2 or claim 3 in which the ply-to-ply peel strength of the central layer is at least 36 kg/m.

5. A membrane according to any one of the preceding claims in which the fibres of the nonwoven fibre layers (14, 24) are polyester, nylon or polypropylene.

6. A membrane according to any one of the preceding claims in which the central layer is from 0.6 to 1.3mm thick.

7. A membrane according to any one of the preceding claims in which a proportion of at least about 20vol% of the fibres of the non-woven fibre layers is embedded in the central layer.

8. A membrane according to any one of the preceding claims in which the lamina has a hydrostatic pressure resistance of at least $6.9 \times 10^5$ N/m² and a tensile strength of at least $76 \times 10^5$ N/m², and is crack-free when subject to a Masland impact test at -4°C.

9. A masonry construction comprising a masonry substrate (40), a lamina lamina (10) according to any one of claims 1 to 8 having one face bonded to the masonry substrate (40) by bonding material (50), and a masonry exterior article (30) bonded to the other face of the lamina (10) by bonding material (50).

10. A masonry construction according to claim 9 in which the masonry exterior article (30) is a tile or facing.

11. A method of making a water-resistant, masonry-bondable membrane comprising:

   a lamina (10) having a central layer comprising at least one ply (12, 22) of a flexible material, and a nonwoven fibre layer (14, 24) directly physically bonded to each face of said central layer, characterised in that the flexible material is polyvinyl chloride or a vinyl chloride copolymer, having from 35 to 55 parts of plasticiser per 100 parts by weight of said polymer,

   said method comprising superimposing the non-woven fibre layer and the central layer and carrying out a bonding operation to create the physical bond between them.

12. A method according to claim 11 in which the bonding operation uses applied heat and pressure to embed fibres of the non-woven fibre layer in the central layer.

13. A method according to claim 11 or claim 12 in which respective non-woven fibre layers are applied to respective ones of two separate flexible layers and bonded thereto to form respective physical bonds, and the flexible layers are then bonded together face to face to form a two-ply central layer.

14. A method according to claim 13 in which the flexible layers are heat-fused together.

**Patentansprüche**

1. Wasserfeste, mit Mauerwerk verbindbare Membran, umfassend:

   ein Laminat (10) mit einer Mittelschicht, die zumindest eine Lage (12, 22) aus einem flexiblen Material aufweist, wobei an jede der beiden Oberflächen der Mittelschicht eine Faservliesschicht (14,24) direkt physikalisch gebunden ist, dadurch gekennzeichnet, daß das flexible Material Polyvinylchlorid oder ein Vinylchlorid-Copolymer mit
2. Membran nach Anspruch 1, worin die Mittelschicht zwei Lagen (12, 22) umfaßt, die flächig miteinander verbunden sind.

3. Membran nach Anspruch 2, worin jede der beiden Lagen (12, 22) aus dem flexiblen Material besteht und die Lagen miteinander durch Erhitzen verschmolzen sind.

4. Membran nach Anspruch 2 oder 3, worin die Abschälfestigkeit zwischen den Lagen der Mittelschicht zumindest 36 kg/m beträgt.

5. Membran nach einem der vorangegangenen Ansprüche, worin die Fasern der Faservlies-Schichten (14, 24) aus Polyester, Nylon oder Polypropylen bestehen.

6. Membran nach einem der vorangegangenen Ansprüche, worin die Mittelschicht 0,6 bis 1,3 mm dick ist.

7. Membran nach einem der vorangegangenen Ansprüche, worin ein Anteil von zumindest etwa 20 Vol.-% der Fasern der Faservlies-Schichten in der Mittelschicht eingebettet ist.

8. Membran nach einem der vorangegangenen Ansprüche, worin das Laminat eine Beständigkeit gegen hydrostatischen Druck von zumindest 6,9 x 10^5 N/m² und eine Zugfestigkeit von zumindest 76 x 10^5 N/m² aufweist und nach einem Masland-Schlagversuch bei -4°C keine Risse zeigt.

9. Mauerwerkskonstruktion, umfassend ein Mauerwerksubstrat (40), ein Membranlaminat (10) nach einem der Ansprüche 1 bis 8, wovon eine Oberfläche mittels Bindematerial (50) mit dem Mauerwerksubstrat (40) verbunden ist, und eine äußere Mauerwerkkomponente (30), die mittels Bindematerial (50) mit der anderen Oberfläche des Laminats (10) verbunden ist.

10. Mauerwerkskonstruktion nach Anspruch 9, worin die äußere Mauerwerkkomponente (30) eine Fliese oder Außenverkleidung ist.

11. Verfahren zur Herstellung einer wasserfesten, mit Mauerwerk verbindbaren Membran, umfassend:

   ein Laminat (10) mit einer Mittelschicht, die zumindest eine Lage (12, 22) aus einem flexiblen Material aufweist, wobei an jede der beiden Oberflächen der Mittelschicht eine Faservliesschicht (14, 24) direkt physikalisch gebunden ist,
   dadurch gekennzeichnet, daß das flexible Material Polyvinylchlorid oder ein Vinylchlorid-Copolymer mit 35 bis 55 Gewichtsteilen Weichmacher pro 100 Gewichtsteilen Polymer ist

   wobei das Verfahren die Übereinanderlagen der Faservlies-Schicht und der Mittelschicht und das Durchführen eines Verbindungsvorgangs umfaßt, um eine physikalische Bindung zwischen ihnen herzustellen.


13. Verfahren nach Anspruch 11 oder 12, worin jeweilige Faservlies-Schichten auf jeweilige von zwei getrennten flexiblen Schichten aufgebracht und mit diesen verbunden werden, um jeweils eine physikalische Bindungen herzustellen, und die flexiblen Schichten dann flächig miteinander verbunden werden, um eine zweilagige Mittelschicht zu bilden.

14. Verfahren nach Anspruch 13, worin die flexiblen Schichten miteinander durch Erhitzen verschmolzen werden.

Reivendications

1. Membrane reliable for maçonnerie, résistante à l'eau comportant :

   une lamelle (10) avec une couche centrale comprenant au moins une couche (12, 22) en un matériau flexible, et une couche de fibres non-tissées (14, 24) reliée directement physiquement à chaque face de ladite couche centrale, caractérisée en ce que le matériau flexible est un chlorure de polyvinyle ou un copolymère de chlo-
2. Membrane selon la revendication 1, où la couche centrale comporte deux couches (12, 22) reliées ensemble face à face.

3. Membrane selon la revendication 2, où les deux couches (12, 22) sont toutes les deux réalisées dans ledit matériau flexible et sont thermo-soudées ensemble.

4. Membrane selon la revendication 2 ou la revendication 3, où la résistance au décollement de couche en couche de la couche centrale est au moins de 36 kg/m².

5. Membrane selon l'une des revendications précédentes, où les fibres des couches en fibres non-tissées (14, 24) sont en polyester, en nylon ou en polypropylène.

6. Membrane selon l'une des revendications précédentes, où la couche centrale a une épaisseur comprise entre 0,6 et 1,3 mm.

7. Membrane selon l'une des revendications précédentes, où une proportion d'au moins environ 20 % en volume des fibres des couches en fibres non-tissées est noyée dans la couche centrale.

8. Membrane selon l'une des revendications précédentes, où la lamelle a une résistance à la pression hydrostatique d'au moins 6,9 x 10⁶ N/m² et une résistance à la traction d'au moins 76 x 10⁵ N/m², et est exempte de craquelures lorsqu'elle est soumise à un test d'impact Masland à -4°C.

9. Construction de maçonnerie comportant un substrat de maçonnerie (40), une lamelle de membrane (10) en accord avec l'une des revendications 1 à 8 avec une face liée au substrat de maçonnerie (40) par un matériau de liaison (50), et un article (30) extérieur à la maçonnerie lié à l'autre face de la lamelle (10) par un matériau de liaison (50).

10. Construction de maçonnerie selon la revendication 9, où l'article extérieur de maçonnerie (30) est un carreau ou une pierre de parement.

11. Procédé pour fabriquer une membrane flexible pour maçonnerie, résistant à l'eau, comportant :

   une lamelle (10) avec une couche centrale comprenant au moins une couche (12, 22) en matériau flexible, et
   une couche en fibres non-tissées (14, 24) directement liée physiquement à chaque face de ladite couche centrale, caractérisée en ce que le matériau flexible est du chlorure de polyvinyle ou un copolymère de chlorure de vinyle, ayant de 35 à 55 parts en plastifiant par 100 parts en poids dudit polymère,

   ledit procédé comportant la superposition de la couche en fibres non-tissées et de la couche centrale et l'exécution d'une opération de liaison pour créer la liaison physique entre celles-ci.

12. Procédé selon la revendication 11, où l'opération de liaison utilise l'application de chaleur et de pression pour noyer les fibres de la couche de fibres non-tissées dans la couche centrale.

13. Procédé selon la revendication 11 ou la revendication 12, où les couches respectives en fibres non-tissées sont appliquées à des couches respectives de deux couches flexibles séparées et sont liées à celles-ci pour former des liens physiques respectifs, et les couches flexibles sont ensuite liées ensemble face à face pour former une couche centrale à deux couches.

14. Procédé selon la revendication 13, où les couches flexibles sont thermo-soudées ensemble.