

(19)



(11)

EP 1 709 132 B2

(12)

NEW EUROPEAN PATENT SPECIFICATION

After opposition procedure

(45) Date of publication and mention
of the opposition decision:
29.04.2015 Bulletin 2015/18

(51) Int Cl.:
C09J 123/20 ^(2006.01) **E04B 1/76** ^(2006.01)
E04D 13/16 ^(2006.01) **C08K 7/04** ^(2006.01)

(45) Mention of the grant of the patent:
21.05.2008 Bulletin 2008/21

(86) International application number:
PCT/EP2005/000488

(21) Application number: **05701042.3**

(87) International publication number:
WO 2005/068574 (28.07.2005 Gazette 2005/30)

(22) Date of filing: **19.01.2005**

(54) **PROCESS FOR MANUFACTURING PANELS OF MINERAL WOOL**

VERFAHREN ZUR HERSTELLUNG VON MINERALFASERPLATTEN

PROCEDE DE FABRICATION DE PANNEAUX DE LAINE MINERALE

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
HR

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(30) Priority: **19.01.2004 PL 36445204**
16.03.2004 PL 36631904

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(43) Date of publication of application:
11.10.2006 Bulletin 2006/41

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EP 1 709 132 B2

Description

[0001] The present invention relates to processes for manufacturing panels of lamellar mineral wool, for use as sound, thermal and fireproof insulation of external walls of buildings, as well as ceilings of garages over which heated rooms are located.

[0002] Some methods for manufacturing panels of mineral wool are known. Technologies currently in use are based on the ascertainment that, most preferably, mineral wool fibres should be arranged perpendicularly to the surface of an insulated wall. Such an arrangement of fibres increases by many times the tensile strength when the tension is perpendicular to the panel surface, at a density lower than in other panels manufactured by traditional methods and with good (the best) thermal insulation, and at the same time it comprises the most ecological solution - lamellar panels may be fastened only with the use of gluing mortars, and they do not require the use of mechanical fasteners on carrying surfaces of the buildings which are up to 20 m high. Fibres arranged parallel to the wall plane tend to be torn off the panel surface under the influence of atmospheric conditions, and such panels must always be bonded to the walls both mechanically and with gluing mortars.

[0003] In the course of development of panel manufacturing systems various solutions have been proposed, aimed either at providing a better thermal insulation, or at obtaining more rigid panels.

[0004] US 4,025,680 discloses a multilayer panel composed of layers arranged in such a way that the arrangement of fibres within the layers is alternately parallel or perpendicular to the surface. Layers may have different densities.

[0005] DE 31 36 935 discloses mineral wool panels or webs composed of layers, wherein within a given web or panel said layers and fibres forming them run uniformly at an angle of 10° to 60° in relation to the panel or web plane.

[0006] EP 0 017969 discloses a method wherein from a continuous web of mineral non-woven fabric, having fibres running mainly parallel to the web surface, strips or layers are cut off crosswise to the web, then said strips or layers are rotated by 90° and said layers are bonded to a fabric mesh with adhesive. This way mineral fibres run mainly vertically in relation to the surface of manufactured insulating layer.

[0007] EP 0 560 878 (WO92/10602) discloses a process for manufacturing insulating panels composed of elements made of mineral fibres bonded together in the form of rods. In this process one mainly aims at obtaining a secondary non-woven fabric by doubling a primary non-woven fabric which in turn is obtained by arranging it in a series of layers running crosswise to the length of said secondary non-woven fabric, cutting the secondary non-woven fabric lengthwise in lamellae, cutting said lamellae to desired length, rotating said lamellae by 90° about their longitudinal axis, bonding them together to form a panel

and subjecting said lamellae to compression by a force acting perpendicularly to the surface, whereby longitudinal compression occurs, before or after the mineral non-woven fabric has been cut into lamellae. That invention was based on the discovery that a panel wherein both folds (made by longitudinal compression of non-woven fabric to be cut into lamellae) and individual fibres are arranged perpendicularly to the panel plane, is characterised by higher strength and rigidity than a panel wherein folds are arranged perpendicularly to the panel surface. In the course of manufacturing mineral wool panels a fibre melt is applied onto the external surface of spinning wheels and simultaneously a fibre bonding agent is sprayed thereon. Generally heat-curable bonding agents are used, such as a phenol-formaldehyde resin. Said resin, contained in the mineral wool mass, serves also for bonding rods together to form a panel.

[0008] DE-A-3223246 describes an insulation slab having a core layer and at least one cover layer. The core layer is made in lamellar form from a number of bars bonded together at their side surfaces. The core is firmly bonded on one or both sides to a curable or prefabricated cover layer. A method for making the core is described. This involves providing a number of slabs bonded together at their largest surfaces and having the mineral fibres lying in the plane of the slab. The thus-formed block is cut lengthways and perpendicular to the plane of the bonded mineral-fibre slabs to form a lamellar element of the desired thickness comprising longitudinal bars which are firmly bonded together. After this the lamellar element is firmly bonded to the cover layer. The layers are bonded together using adhesive which is described generally as being non-flammable and inorganic, such as water glass.

[0009] Bonding rods together with the use of a bonding agent has not been employed in practice because the contact area of rods is much larger than the contact area of such a panel with a substrate it is to be laid on. In order to obtain a panel 20 cm wide it is necessary to bond a plurality of so-formed rods together. Our attempts to bond individual rods together with the use of the same bonding agent that was used for bonding fibres did not give the expected results.

[0010] In practice rods are bonded together with the use of strips, tapes, non-woven fabric or paper, on one side or on both sides of the panel (as in EP 017,969 above), yet the panel obtained in this manner is not rigid, and thus difficult to place on a building façade, and for this reason in practice such a panel cannot have a large size.

[0011] Insulating characteristics of ready made panels additionally depend upon the way in which individual panels are bonded together at a construction site. The bigger the number of small panels necessary to form a requested surface, the bigger the number of edges at which panels are in mutual contact. The bigger the number of contact edges between the panels, the bigger the number of thermal bridges forming on the insulated surface as a result of inaccurate laying, improper adjustment of indi-

vidual panels, and also as a result of increased risk of soiling contact surfaces with gluing mortars. At the same time the bigger the number of panels used to lay on an insulated surface, the longer the time required for laying the insulation on the building façade, and the costs of work is relatively higher than in case of larger panels.

[0012] On the other hand the size of produced panels is determined by the fact that the perpendicular arrangement of fibres in relation to the insulated surface is the most advantageous one, whereas on production lines a non-woven fabric is produced having its fibres arranged parallel to the panel surface. Therefore in order to manufacture a plate with fibres arranged perpendicularly to the insulated surface, it is necessary to cut off a strip from a web of non-woven fabric having a given thickness and to rotate said strip by 90° in order to change the fibre orientation. This in turn means that the thickness of so-obtained layer of non-woven fabric becomes, after the rotation, the maximum width of the panel.

[0013] Therefore the prior art has not sought a non-woven fabric of maximum thickness, but instead attention was focused on increasing the surface area of the obtained panel by cutting it lengthwise into thin rods, rotating these rods and subsequently bonding them together with the use of an additional connecting layer, e.g. made of paper. Besides in practice the size of the obtained panels did not exceed 20 cm x 120 cm, since lamellar panels of larger surface were insufficiently rigid and were not suitable for laying on flat vertical surfaces. A characteristic feature of so obtained panels is that lamellae constituting their elements have considerably smaller width than thickness.

[0014] In the process of the invention an attempt was made to reverse the approach to the techniques for manufacturing panels of mineral wool.

[0015] Thus in a first aspect of the invention we provide a method of bonding the surfaces of two elements formed of mineral fibre as defined in claim 1.

[0016] We find that the use of this particular type of adhesive, especially when it has the preferred features set out below, provides particularly durable connections for mineral wool elements, especially as the fibres are oriented predominantly parallel to the surfaces which are bonded, as in the production of lamellar insulation panels.

[0017] The hot melt adhesive is applied to the surfaces to be bonded by spraying and this spraying preferably lasts no more than 12 seconds.

[0018] After application of the adhesive the elements are subjected to pressure during bonding and preferably the total time for spraying and subjection to pressure is not more than 12 seconds.

[0019] In the process of the invention panels can be moved along stationary nozzles or stationary panels can be sprayed with the use of movable nozzles. Spraying time and adhesive bonding time is 12 seconds maximum. Panels sprayed with the adhesive are pressed together.

[0020] The adhesive can be applied to just one of the surfaces to be bonded but preferably it is applied to both.

[0021] It turned out that it was advantageous to prevent the penetration of the adhesive into deeper layers of the panel, and that such a connection would be more durable than a connection made by another method. Generally the adhesive does not penetrate more than 2 mm into the element.

[0022] Due to the short setting time of the adhesive, particular attention has to be paid to accurate positioning of strips relative to each other.

[0023] The hot melt adhesive is preferably applied at a temperature of from 150 to 185°C. Preferably the hot melt adhesive is a polyolefin-based adhesive. Its melting point is from 50 to 200 °C, preferably from 80 to 120°C, and especially about 100°C.

[0024] The panel may be made by gluing two or three strips (elements) together, which in case of maximum obtainable thickness of non-woven fabric layer makes it possible to obtain a panel of width of even 60 cm. In comparison with a conventional panel of width not exceeding 20 cm, it is possible to reduce by three times the time of laying insulation on a wall, as well as to reduce by three times the number of formed thermal bridges. The resulting width of so-obtained elements of the final product is always at least equal or greater than their thickness.

[0025] These benefits are achieved partly due to the choice of the adhesive used and the resulting strength of the bond between the elements. However, this benefit is also achieved by the method by which the elements are cut from the web and bonded together to form the insulation panel.

[0026] Thus according to a second aspect of the invention we provide a method of forming a mineral wool insulation panel comprising

providing a web of mineral wool having a top face and a bottom face and two opposing side faces and a first end defining the width of the web and a longitudinal direction parallel to the top and bottom faces and side faces and a transverse direction parallel to the top and bottom faces and perpendicular to the side faces, and a thickness between the top and bottom faces,

cutting at least two elements from the web, the cut being made in the transverse direction, so that the top and bottom faces of each element are formed from the top and bottom faces of the web,

bonding two elements together with the top face of one element being bonded to the bottom face of the other element to form a pre-panel,

and cutting from the pre-panel at least one insulation-panel comprising parts of at least two elements and having a predetermined thickness in which the thickness direction of the insulation panel is parallel to the bonded surfaces of the elements forming the pre-panel, characterized in that the elements are bonded together using hot melt adhesive applied to one or both faces to be bonded by spraying.

[0027] In the second aspect of the invention the bonding between the elements is carried out preferably using

the preferred aspects set out in connection with the second aspect of the invention.

[0028] In a third aspect of the invention, we provide a process for manufacturing panels of mineral wool as defined in claim 18.

[0029] In all aspects of the invention the final panel preferably does not include a cover layer but instead consists essentially of the mineral wool elements and the adhesive used to bond them together.

[0030] In all aspects of the invention, two or three (and in some cases more) elements can be bonded together to form the insulation panel. In this case they are bonded together at their largest surfaces. That is, the bottom surface of the first element is bonded to the top surface of the second element and the bottom surface of the second element is bonded to the top surface of the third element.

[0031] The insulation panels provided are useful for insulating various surfaces, including external walls of buildings and ceilings of garages over which heated rooms are located. They may be used as sound, thermal or fire insulation.

[0032] The insulation panel is applied to the surface to be insulated so that the bonded surfaces are perpendicular to the insulated surface. In the case where the web from which the elements are cut is formed so that the mineral fibres are predominantly parallel to the top and bottom surfaces of the web then this means that the fibres in the insulation panel are predominantly perpendicular to the surface to be insulated, as is preferred as indicated above.

[0033] The web from which the elements are cut can be formed in known manner. Generally it is produced by providing a mineral charge in a furnace, melting the mineral charge to form a mineral melt and forming the mineral melt into fibres. These fibres are collected as a web on a conveyer.

[0034] Fiberisation can be carried out for instance using rotors having a solid surface which are mounted about a substantially horizontal axis. The melt is applied to the surface of a rotor and flung from it to form fibres. Generally a series of rotors is used so that fibres are flung from a first rotor to a second rotor and from a second rotor to a third and optionally subsequent rotor(s). This system is known as a cascade spinner.

[0035] Alternatively, the fibres can be made using the well known spinning cup system in which fibres are thrown through apertures in a rotating cup and collected.

[0036] After collection on the conveyer the fibres can be treated, for instance by cross-lapping and/or compression. Generally they are formed into slabs which form the web from which elements can be cut in the invention.

[0037] Generally binder material is applied to the fibres before they are collected on the conveyer. This binder is usually heat-curable binder and the web of fibres is passed through a curing oven to cure the binder.

[0038] In all aspects of the invention the web from which elements are cut is preferably of unusually large thickness (ie the dimension between the top and bottom

surfaces of the web). This thickness is preferably at least 100 mm, more preferably at least 150 mm and often at least 180 mm, in particular around 200 mm.

[0039] In all aspects of the invention the mineral wool material preferably has a density from 50 to 200 kg/m³, more preferably 75 to 130 kg/m³, in particular from 80 to 100 kg/m³, for instance around 90 kg/m³.

[0040] In all aspects of the invention cutting of the elements can be done in a conventional manner, for instance using saws.

Example I

[0041] From a web of non-woven fabric leaving the production line, said web being 20 cm thick and 2 m wide and having fibres oriented parallel to the plane of the non-woven fabric, strips 1.2 m wide were cut off crosswise. Said strips, 1.2 m long, 20 cm wide and 20 cm thick, were glued together by two at their largest surfaces. A thermofusible polyolefin-based adhesive was used, having fusing point of about 100°C and working viscosity of 2700 mPa.s at 170°C. The adhesive was sprayed for 2.4 seconds with the use of stationary nozzles onto the opposite moving strips of non-woven fabric. Fifty spraying nozzles were used per each glued surface. The distance between nozzles and moving strips was 55 mm. Adhesive consumption amounted to 3.36 g of adhesive per one glue line 1.2 m long. The obtained panels were pressed together for 6 seconds. From the obtained panels strips 8 cm thick were cut off, said cutting being performed along the dimension of 1.2 m, and further sent for packing. The panel had the following dimensions: width - 40 cm, thickness - 8 cm, length - 1.2 m, and its fibres were arranged vertically to the insulated surface. A façade insulation made of the above mentioned panels was laid twice as quickly as in the case of traditional façade of single panels, and at the same time the panels bonded this way did not break at connection area, and could be lifted by one edge by a single worker, thus the obtained connection was durable. The amount of thermal bridges was reduced by half.

Example II

[0042] From a web of non-woven fabric leaving the production line, said web being 20 cm thick and 2 m wide and having fibres oriented parallel to the plane of the non-woven fabric, strips 1.2 m wide were cut off crosswise. The procedure was as in Example I, but three strips were glued together. A thermofusible polyolefin-based adhesive was used having fusing point of about 100°C and working viscosity of 2700 mPa.s at 170°C. The adhesive was sprayed for 2.4 seconds with the use of nozzles onto the opposite strips of non-woven fabric. Fifty spraying nozzles were used per each of the four glued surfaces. The distance between nozzles and strips was 55 mm. Adhesive consumption amounted to 2.36 g of adhesive per one glue line 1.2 m long. The obtained panels were

pressed together for 8 seconds. From the obtained panels strips 8 cm wide were cut off, said cutting being performed along the dimension of 1.2 m, and further sent for packing. The panel had the following dimensions: width - 60 cm, thickness - 20 cm, length - 1.2 m, and its fibres were arranged vertically to the insulated surface. A façade made of the above mentioned panels was laid three times as quickly as in the case of traditional façade of single panels, and at the same time the panels bonded this way did not break at connection area, and could be lifted by one edge by a single worker, thus the obtained connection was durable.

Example III

[0043] From a web of non-woven fabric leaving the production line, said web being 20 cm thick, 1.2m wide and 2 m long and having fibres oriented parallel to the plane of the non-woven fabric, strips 1.2 m wide were cut off crosswise. Said strips, 1.2 m long, 20 cm wide and 8 cm thick, were glued together by two at their largest surfaces. A thermofusible polyolefin-based adhesive was used, having fusing point of about 100°C and working viscosity of 2700 mPa.s at 170°C. The adhesive was sprayed for 2.4 seconds with the use of stationary nozzles onto the opposite moving strips of non-woven fabric. Fifty spraying nozzles were used per each glued surface. The distance between nozzles and moving strips was 55 mm. Adhesive consumption amounted to 3.36 g of adhesive per one glue line 1.2 m long. The obtained panels were pressed together for 6 seconds. The obtained panels were sent for packing. The panel had the following dimensions: width - 40 cm, thickness - 8 cm, length-1.2 m, and its fibres were arranged vertically to the insulated surface. A façade insulation made of the above mentioned panels was laid twice as quickly as in the case of traditional façade of single panels, and at the same time the panels bonded this way did not break at connection area, and could be lifted by one edge by a single worker, thus the obtained connection was durable. The amount of thermal bridges was reduced by half.

Example IV

[0044] From a web of non-woven fabric leaving the production line, said web being 20 cm thick, 1.2m wide and 2 m long and having fibres oriented parallel to the plane of the non-woven fabric, strips 1.2 m wide were cut off crosswise. The procedure was as in Example I, but three strips were glued together. A thermofusible polyolefin-based adhesive was used having fusing point of about 100°C and working viscosity of 2700 mPa.s at 170°C. The adhesive was sprayed for 2.4 seconds with the use of nozzles onto the opposite strips of non-woven fabric. Fifty spraying nozzles were used per each of the four glued surfaces. The distance between nozzles and strips was 55 mm. Adhesive consumption amounted to 2.36 g of adhesive per one glue line 1.2 m long. The obtained

panels were pressed together for 8 seconds. The obtained panels were further sent for packing. The panel had the following dimensions: width - 60 cm, thickness - 8 cm, length -1.2 m, and its fibres were arranged vertically to the insulated surface. A façade made of the above mentioned panels was laid three times as quickly as in the case of traditional façade of single panels, and at the same time the panels bonded this way did not break at connection area, and could be lifted by one edge by a single worker, thus the obtained connection was durable.

Example V

[0045] From a web of non-woven fabric leaving the production line, said web being 20 cm thick and 2 m wide and having fibres oriented lengthwise, strips 1.2 m wide were cut off crosswise. Said strips were rotated by 90° in horizontal plane. Then these strips were cut into strips 8 cm wide (this dimension is the final thickness of manufactured insulation) which were rotated by 90° around longitudinal axis thereof. The so-obtained strips, 1.2 m long, 20 cm wide and 8 cm thick, were glued together, by two. A thermofusible polyolefin-based adhesive was used, having fusion point of about 100°C and working viscosity of 2700 mPa.s at 170°C. The adhesive was sprayed for 2.4 seconds with the use of stationary nozzles onto the opposite moving strips of non-woven fabric. Two spraying nozzles were used, one spraying nozzle per each glued surface. The distance between nozzles and moving strips was 55 mm. Adhesive consumption amounted to 3.36 g of adhesive per one glue line 1.2 m long. The obtained panels were pressed together for 6 seconds. The obtained panels were sent further for packing. The panel had the following dimensions: width - 40 cm, thickness - 8 cm, length-1.2 m, and its fibres were arranged vertically to the insulated surface. The façade insulation made of the above mentioned panels was laid twice as quickly as in the case of traditional insulation of single panels, and at the same time the panels bonded this way did not break at the area of connection, and could be lifted by one edge by a single worker, thus the obtained connections were durable. The amount of thermal bridges was reduced by half.

Example VI

[0046] From a web of non-woven fabric leaving the production line, said web being 20 cm thick and 2 m wide and having lengthwise oriented fibres, strips 1.2 m wide were cut off crosswise. Said strips were rotated by 90° in horizontal plane. Then these strips were cut into strips 20 cm wide (this dimension is a final thickness of manufactured insulation), and rotated by 90° around the longitudinal axis thereof. The so-obtained strips, 1.2 m long, 20 cm wide and 20 cm thick, were glued together by three. A thermofusible polyolefin-based adhesive was used, having fusing point of about 100°C and working viscosity of 2700 mPa.s at 170°C. The adhesive was

sprayed for 2.4 seconds with the use of stationary nozzles onto the opposite moving strips of non-woven fabric. Twelve spraying nozzles were used, three spraying nozzles per each of four glued surfaces. The distance between nozzles and moving strips was 55 mm. Adhesive consumption amounted to 3.36 g adhesive per one glue line 1.2 m long. The obtained panels were pressed together for a period of 8 seconds. The obtained finished panels were sent further for packing. The panel had the following dimensions: width - 60 cm, thickness - 20 cm, length - 1.2 m, and its fibres were arranged vertically to the insulated surface. The façade insulation made of the above mentioned panels was laid three times as quickly as in the case of traditional insulation of single panels; and at the same time the panels bonded this way did not break at the area of connection, and could be lifted by one edge by a single worker, thus the obtained connections were durable.

Claims

1. A method of bonding together the surfaces of two elements formed of mineral fibre, wherein the two elements have been cut from a mineral fibre web such that the mineral fibres forming the elements are oriented predominantly parallel to the surfaces to be bonded, the method comprising applying an adhesive to one or both of the surfaces to be bonded together, **characterized in that** the adhesive is a hot melt adhesive which has a melting point of from 50 to 200°C and **in that** the adhesive is applied to one or both of the surfaces to be bonded by spraying.
2. A method according to claim 1 in which the spraying time is not more than 12 seconds.
3. A method according to claim 1 or claim 2 in which after application of the adhesive the two elements are pressed together to bond the surfaces together, wherein the total time for application of the adhesive and the pressing is not more than 12 seconds.
4. A method according to any preceding claim in which the adhesive is at a temperature of from 150 to 185°C on application.
5. A method according to any preceding claim in which the hot melt adhesive is a polyolefin-based hot melt adhesive.
6. A method according to any preceding claim in which the hot melt adhesive has a melting point of from 80 to 120°C, more preferably about 100°C.
7. A method according to any preceding claim in which adhesive is applied to both of the surfaces to be bonded.
8. A method according to any preceding claim which is a method of bonding together three mineral fibre elements.
9. Use of the product of the method of any of claims 1 to 8 as an insulation panel.
10. Use according to claim 9 wherein the insulation panel is applied to a surface to be insulated and the bonded surfaces in the panel are perpendicular to the surface to be insulated, such that the fibres in the panel are predominantly perpendicular to the surface to be insulated.
11. A method of forming a mineral wool insulation panel comprising providing a web of mineral wool having a top face and a bottom face and two opposing side faces and a first end defining the width of the web and a longitudinal direction parallel to the top and bottom faces and side faces and a transverse direction parallel to the top and bottom faces and perpendicular to the side faces, and a thickness between the top and bottom faces, cutting at least two elements from the web, the cut being made in the transverse direction, so that the top and bottom faces of each element are formed from the top and bottom faces of the web, bonding two elements together with the top face of one element being bonded to the bottom face of the other element to form a pre-panel, and cutting from the pre-panel at least one insulation panel comprising parts of at least two elements and having a predetermined thickness in which the thickness direction of the insulation panel is parallel to the bonded surfaces of the elements forming the pre-panel, **characterized in that** the elements are bonded together using hot melt adhesive applied to one or both of the faces to be bonded by spraying.
12. Use of an insulation panel produced according to claim 11 as an insulation panel on a surface to be insulated, wherein the insulation panel is applied to the surface to be insulated so that the bonded surfaces of the elements forming the insulation panel are perpendicular to the surface to be insulated, whereby the mineral fibres in the insulation panel are predominantly perpendicular to the surface to be insulated.
13. A method according to claim 11 in which the insulation panel is formed by bonding three elements.
14. A method according to claim 11 in which the thickness of the web is at least 10 cm, preferably at least 20 cm.
15. A method according to claim 11 in which bonding is

carried out using any of the features recited in claims 2 to 4 and 7.

16. A method according to claim 11 in which the adhesive has any of the features recited in claims 5 to 6. 5
17. A use according to claim 9 or claim 10 or claim 12 in which the insulation panel consists essentially of the mineral wool elements and the adhesive. 10
18. A process for manufacturing panels of mineral wool comprising a step of producing a web of mineral wool with fibres arranged parallel to the plane of the non-woven fabric, cutting off elements therefrom, and then bonding the so-obtained elements together, **characterized in that** a web of mineral non-woven fabric is obtained having a maximal technologically obtainable width of 20 cm, then a strip is cut off therefrom, said strip having a width corresponding to a required final panel length, the so-obtained strips are bonded together by the largest surfaces, the bonding being effected by gluing with the use of a layer of hot adhesive sprayed on one or both bonded surfaces at a temperature of 150-185°C and then the panels sprayed with the adhesive are pressed together, the maximum time of spraying and adhesive setting being 12 seconds, and the so-obtained panels are cut into strips of thickness corresponding to the insulation thickness, said cutting being performed along the dimension corresponding to the length of the panel. 15
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Patentansprüche

1. Verfahren zum Miteinanderverbinden der Oberflächen von zwei Elementen, die aus Mineralfaser gebildet sind, wobei die beiden Elemente so aus einer Mineralfaserbahn geschnitten werden, dass die die Elemente bildenden Mineralfasern überwiegend parallel zu den zu verbindenden Oberflächen orientiert sind, wobei das Verfahren das Aufbringen eines Klebstoffs auf eine der oder beide Oberflächen, die miteinander zu verbinden sind, umfasst, **dadurch gekennzeichnet, dass** der Klebstoff ein Schmelzkleber ist, der einen Schmelzpunkt von 50 bis 200°C aufweist, und dass der Klebstoff durch Sprühen auf eine der oder beide zu verbindende Oberflächen aufgebracht wird. 40
2. Verfahren nach Anspruch 1, bei dem die Sprühdauer nicht mehr als 12 Sekunden beträgt. 45
3. Verfahren nach Anspruch 1 oder Anspruch 2, bei dem nach Aufbringung des Klebstoffs die beiden Elemente zusammengepresst werden, um die Oberflächen miteinander zu verbinden, wobei die Gesamtdauer zur Aufbringung des Klebstoffs und zum 50
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Pressen nicht mehr als 12 Sekunden beträgt.

4. Verfahren nach irgendeinem vorhergehenden Anspruch, bei dem der Klebstoff bei Aufbringung bei einer Temperatur von 150 bis 185°C vorliegt.
5. Verfahren nach irgendeinem vorhergehenden Anspruch, bei dem der Schmelzkleber ein Schmelzkleber auf Polyolefinbasis ist.
6. Verfahren nach irgendeinem vorhergehenden Anspruch, bei dem der Schmelzkleber einen Schmelzpunkt von 80 bis 120°C, bevorzugter etwa 100°C aufweist.
7. Verfahren nach irgendeinem vorhergehenden Anspruch, bei dem der Klebstoff auf beide zu verbindende Oberflächen aufgebracht wird.
8. Verfahren nach irgendeinem vorhergehenden Anspruch, welches ein Verfahren zum miteinander Verbinden von drei Mineralfaserelementen ist.
9. Verwendung des Produkts des Verfahrens nach irgendeinem der Ansprüche 1 bis 8 als Isolierplatte.
10. Verwendung nach Anspruch 9, bei der die Isolierplatte auf eine zu isolierende Oberfläche aufgebracht wird und die verbundenen Oberflächen in der Platte senkrecht zu der zu isolierenden Oberfläche sind, sodass die Fasern in der Platte überwiegend senkrecht zu der zu isolierenden Oberfläche vorliegen.
11. Verfahren zur Bildung einer Mineralwoll-Isolierplatte, umfassend das Bereitstellen einer Bahn von Mineralwolle mit einer oberen Fläche und einer unteren Fläche und zwei gegenüberliegenden Seitenflächen und einem ersten Ende, was die Breite der Bahn und eine Längsrichtung parallel zu den oberen und unteren Flächen und Seitenflächen und eine Querrichtung parallel zu den oberen und unteren Flächen und senkrecht zu den Seitenflächen und die Dicke zwischen der oberen und unteren Fläche definiert, das Schneiden von mindestens zwei Elementen aus der Bahn, wobei der Schnitt in Querrichtung durchgeführt wird, sodass die oberen und unteren Flächen jedes Elements aus den oberen und unteren Flächen der Bahn gebildet werden, miteinander Verbinden der beiden Elemente, wobei die obere Fläche des einen Elements mit der unteren Fläche des anderen Elements verbunden wird, um eine Vorplatte zu bilden, und das Schneiden mindestens einer Isolierplatte, umfassend Teile von mindestens zwei Elementen und mit einer vorbestimmten Dicke, aus der Vorplatte, wobei die Dickenrichtung der Isolierplatte parallel zu den verbundenen Oberflächen, der die Vorplatte

bildenden Elemente ist,

dadurch gekennzeichnet, dass die Elemente unter Verwendung eines Schmelzklebers miteinander verbunden werden, der auf einer der oder beide zu verbindenden Flächen durch Sprühen aufgebracht wird.

12. Verwendung einer Isolierplatte, die nach Anspruch 11 hergestellt ist, als Isolierplatte auf einer zu isolierenden Oberfläche, wobei die Isolierplatte auf die zu isolierende Oberfläche aufgebracht wird, sodass die verbundenen Oberflächen der Elemente, welche die Isolierplatte bilden, senkrecht zu der zu isolierenden Oberfläche sind, wodurch die Mineralfasern in der Isolierplatte überwiegend senkrecht zu der zu isolierenden Oberfläche sind.
13. Verfahren nach Anspruch 11, bei dem die Isolierplatte durch Verbinden von drei Elementen gebildet wird.
14. Verfahren nach Anspruch 11, bei dem die Dicke der Bahn mindestens 10 cm, bevorzugt mindestens 20 cm, beträgt.
15. Verfahren nach Anspruch 11, bei dem die Bindung unter Verwendung irgendeines der in den Ansprüchen 2 bis 4 und 7 angegebenen Merkmale durchgeführt wird.
16. Verfahren nach Anspruch 11, bei dem der Klebstoff irgendeines der in den Ansprüchen 5 bis 6 angegebenen Merkmale aufweist.
17. Verwendung nach Anspruch 9 oder Anspruch 10 oder Anspruch 12, bei der die Isolierplatte im wesentlichen aus den Mineralwollelementen und dem Klebstoff besteht.
18. Verfahren zur Herstellung von Platten aus Mineralwolle, umfassend einen Schritt der Herstellung einer Bahn aus Mineralwolle mit Fasern, die parallel zu der Ebene des Vliesstoffs angeordnet sind, das Ausschneiden von Elementen daraus und dann das miteinander Verbinden der so erhaltenen Elemente, **dadurch gekennzeichnet, dass** eine Bahn aus mineralischem Vliesstoff mit einer technologisch maximal erhältlichen Breite von 20 cm erhalten wird, dann ein Streifen daraus ausgeschnitten wird, wobei der Streifen eine Breite aufweist, die der erforderlichen endgültigen Plattenlänge entspricht, die so erhaltenen Streifen über die größte Oberfläche miteinander verbunden werden, wobei die Bindung durch Kleben unter Verwendung einer Schicht von warmem Klebstoff, der auf eine der oder beide gebundenen Oberflächen bei einer Temperatur von 150 bis 185°C gesprüht wird, bewirkt wird und die Platten, die mit dem Klebstoff besprüht sind, dann zusammengepresst werden, wobei die maximale Dauer des Sprühens

und Wärmehärtens 12 Sekunden beträgt und die so erhaltenen Platten in Streifen mit einer Dicke, die der Isolierdicke entspricht, geschnitten werden, wobei das Schneiden entlang der Abmessung durchgeführt wird, die der Länge der Platte entspricht.

Revendications

1. Procédé de liaison des surfaces de deux éléments formés à partir de fibre minérale, dans lequel les deux éléments ont été découpés à partir d'une toile de fibre minérale de telle sorte que les fibres minérales formant les éléments sont orientées principalement de façon parallèle par rapport aux surfaces à lier, le procédé comprenant l'étape consistant à appliquer un adhésif sur l'une des surfaces, ou les deux, à lier, **caractérisé en ce que** l'adhésif est un adhésif thermofusible qui a un point de fusion compris entre 50 et 200°C et **en ce que** l'adhésif est appliqué sur l'une des surfaces, ou les deux, à lier par pulvérisation.
2. Procédé selon la revendication 1, dans lequel le temps de pulvérisation n'est pas supérieur à 12 secondes.
3. Procédé selon la revendication 1 ou la revendication 2, dans lequel, après l'application de l'adhésif, les deux éléments sont pressés ensemble pour lier les surfaces ensemble, dans lequel le temps total pour l'application de l'adhésif et le pressage n'est pas supérieur à 12 secondes.
4. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'adhésif est à une température comprise entre 150 et 185°C lors de l'application.
5. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'adhésif thermofusible est un adhésif thermofusible à base de polyoléfine.
6. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'adhésif thermofusible a un point de fusion compris entre 80 et 120°C, de manière davantage préférée d'environ 100°C.
7. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'adhésif est appliqué sur les deux surfaces à lier.
8. Procédé selon l'une quelconque des revendications précédentes, lequel procédé est un procédé de liaison de trois éléments de fibre minérale.
9. Utilisation du produit du procédé selon l'une quelconque des revendications 1 à 8 en tant que pan-

- neau isolant.
10. Utilisation selon la revendication 9, dans laquelle le panneau isolant est appliqué sur une surface à isoler et les surfaces liées du panneau sont perpendiculaires par rapport à la surface à isoler, de telle sorte que les fibres du panneau sont principalement perpendiculaires par rapport à la surface à isoler.
11. Procédé de formation d'un panneau isolant de laine minérale comprenant les étapes consistant à mettre à disposition une toile de laine minérale ayant une face supérieure et une face inférieure et deux faces latérales opposées et une première extrémité définissant la largeur de la toile et une direction longitudinale parallèle aux faces supérieure et inférieure et aux faces latérales et une direction transversale parallèle aux faces supérieure et inférieure et perpendiculaire par rapport aux faces latérales, et une épaisseur entre les faces supérieure et inférieure, découper au moins deux éléments à partir de la toile, la découpe étant réalisée dans la direction transversale, de telle sorte que les faces supérieure et inférieure de chaque élément sont formées à partir des faces supérieure et inférieure de la toile, lier les deux éléments ensemble, la face supérieure de l'un parmi les éléments étant liée à la face inférieure de l'autre parmi les éléments pour former un panneau préliminaire, et découper à partir du panneau préliminaire au moins un panneau isolant comprenant des parties d'au moins deux éléments et ayant une épaisseur prédéterminée dans laquelle la direction de l'épaisseur du panneau isolant est parallèle aux surfaces liées des éléments formant le panneau préliminaire, **caractérisé en ce que** les éléments sont liés ensemble au moyen d'un adhésif thermofusible appliqué sur l'une des faces, ou les deux, à lier par pulvérisation.
12. Utilisation d'un panneau isolant produit selon la revendication 11 en tant que panneau isolant sur une surface à isoler, dans laquelle le panneau isolant est appliqué sur la surface à isoler de telle sorte que les surfaces liées des éléments formant le panneau isolant sont perpendiculaires à la surface à isoler, moyennant quoi les fibres minérales du panneau isolant sont principalement perpendiculaires par rapport à la surface à isoler.
13. Procédé selon la revendication 11, dans lequel le panneau isolant est formé par la liaison de trois éléments.
14. Procédé selon la revendication 11, dans lequel l'épaisseur de la toile est d'au moins 10 cm, de préférence d'au moins 20 cm.
15. Procédé selon la revendication 11, dans lequel la liaison est effectuée au moyen de l'une quelconque des caractéristiques exposées selon les revendications 2 à 4 et 7.
16. Procédé selon la revendication 11, dans lequel l'adhésif possède l'une quelconque des caractéristiques selon les revendications 5 à 6.
17. Utilisation selon la revendication 9, la revendication 10 ou la revendication 12, dans laquelle le panneau isolant est essentiellement constitué des éléments de laine minérale et de l'adhésif.
18. Processus de fabrication de panneaux de laine minérale comprenant une étape consistant à produire une toile de laine minérale avec des fibres agencées parallèlement au plan du tissu non tissé, une étape consistant à découper des éléments à partir de celle-ci, puis une étape consistant à lier ensemble les éléments ainsi obtenus, **caractérisé en ce qu'**une toile de tissu minéral non tissé est obtenue avec une largeur maximale pouvant être techniquement obtenue de 20 cm, puis une bande est découpée à partir de celle-ci, ladite bande ayant une largeur correspondant à une longueur du panneau final requise, les bandes ainsi obtenues étant liées ensemble par les surfaces les plus grandes, la liaison étant effectuée par collage au moyen d'une couche d'adhésif chaud pulvérisé sur l'une des surfaces liées, ou les deux, à une température de 150 à 185°C, puis les panneaux pulvérisés avec l'adhésif sont pressés ensemble, le temps maximal de pulvérisation et de prise de l'adhésif étant de 12 secondes, et les panneaux ainsi obtenus étant découpés en bandes d'une épaisseur correspondant à l'épaisseur d'isolation, ladite découpe étant accomplie le long de la dimension correspondant à la longueur du panneau.

REFERENCES CITED IN THE DESCRIPTION

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