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(54) **MINERAL FIBRE BATTS**

MINERALFASERVLIESE

MATELAS EN FIBRES MINÉRALES

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EP 1 448 828 B2

## Description

**[0001]** This invention relates to a use of a batt as insulation according to claim 1.

**[0002]** A conventional mineral fibre batt comprises a bonded mineral fibre network bonded by a cured bonding agent.

**[0003]** Batts having different stiffness at different levels through the thickness of the batt can be made by laminating, with intermeshing at the lamination face, preformed cured batts having different stiffness. Usually it is better to make the batt by curing a mineral fibre web containing uncured bonding agent and which has variable fibre density through the depth or variable binder concentration through the depth.

**[0004]** The web may be made by, for instance, centrifugal fiberisation of a mineral melt of glass, rock, stone or slag, for instance using one or more cascade spinners or one or more spinning cups.

**[0005]** The production of a cured batt having varying binder concentration through the depth may be achieved as described in EP-A-374112. The production of a batt by curing a web having higher fibre density in one layer than the rest may be achieved by conventional dual density processes. In these the mineral fibres and bonding agent are collected as a web, the upper layer of the web is separated and consolidated and rejoined on to the remainder of the web, and the web is then subjected to curing.

**[0006]** In practice it is always necessary to have some binder throughout the batt in order that it retains coherence during handling and use. When using the conventional bonding agents for mineral fibre batts, the batt is made notably stiff even when the amount of bonding agent is as low as is reasonably satisfactory to achieve minimum coherence of the batt.

**[0007]** For many purposes this stiffness is highly desirable. However there are some instances when the stiffness created by low binder amounts is undesirable and there are other cases where it would be desirable to provide a surface layer of lower stiffness in a product which has high binder amounts and/or high density and so is, overall, very stiff.

**[0008]** A process is described in US-A-4,415,51.7 of slitting the surface of a batt and compressing the batt while binder in the batt is partially cured, so as to prevent spring back problems.

**[0009]** A mineral fibre batt disclosed herein has first and second major surfaces and comprises a bonded mineral fibre network which is bonded by a cured bonding agent and which has an inner portion and an outer portion wherein the second surface of the batt is provided by the outer surface of the outer portion, and wherein the outer portion has a depth of at least 5mm and has reduced stiffness due to post-cure compression of the bonded network in the outer portion.

**[0010]** Often the inner portion adjacent the outer portion has the same fibre content type (e.g., average dimensions and chemical type) and distribution, and the same bonding agent and amount, as the outer portion, in which event it is meaningful simply to compare the stiffness of the outer portion with the stiffness of the adjacent inner portion. Sometimes however the adjacent inner portion exhibits also some additional difference, e.g., in fibre content or binder.

**[0011]** The invention is a use of a batt as insulation according to claim 1.

**[0012]** The bonding agent is usually a conventional bonding agent for mineral fibre batts, for instance a phenolic or other curable thermosetting resin. As a result of applying compression from the second face after curing the bonding agent, a product is formed in which the outer portion is less stiff than the inner portion. This presumably is due to fracturing of the bonded network in the outer portion as a result of the compression after curing the bonding agent.

**[0013]** The height compression is applied predominantly from the second face by passing the bonded and cured batt through a nip between a surface which supports the first face and compression means for temporarily compressing the batt at the second face. This will result in fracturing the bonded network in the bonded outer portion of the second face, leaving the bonded network closer to the first layer substantially unchanged.

**[0014]** The preferred compression means comprise at least one compression-applying roller having a diameter less than the total thickness of the batt and which defines a nip which has a depth of 20 to 90% of the thickness of the batt after curing (giving 10 to 80% temporary height compression). Usually the nip has a depth of at least 30 or 40% of the thickness of the batt and generally not more than 70 or 80% of the height of the batt. For instance it may have a depth of around 55% of the height of the batt, thus giving 45% temporary height compression.

**[0015]** The diameter of the or each compression applying roller must be relatively small in order to concentrate the compression forces in the desired region. The diameter is usually less than 75%, and often less than 50%, of the thickness of the batt. It is usually at least 30mm, and is usually below 75mm, often below 40 or 50mm.

**[0016]** The support surface is preferably substantially planar but it can be a surface with a large radius of curvature and which thus gives substantially the same support as a planar surface. For instance the support can be a planar plate or conveyor or drum of large diameter, e.g., at least 5 times the thickness of the batt.

**[0017]** Preferably the compression means comprise a plurality of parallel, compression applying, rollers each having a diameter less than the thickness of the batt (as explained above) and which define with the substantially planar support a nip which decreases in distance as the batt enters the nip, and the final, narrowest, nip preferably is within the range described above. Preferably the nip increases in distance as the batt leaves the nip. Preferably each roller, in plan view, overlaps each adjacent

roller and preferably each defines a step of 3 to 15, often 5 to 10mm, up (or down) from the next.

**[0018]** When it is desired that the outer portion should be very soft, and thus have a low modulus of elasticity, the binder content is usually relatively low, for instance 0.2 to 1.5%, often around 0.3 to 1 or 1.2%. Also, the fibre density is usually relatively low, for instance 20 to 100kg/m$^3$, often around 30 to 90kg/m$^3$. In such products, it is usually then desired for the batt to have a first face of substantially higher density and/or substantially higher binder content, e.g., a density of 100 to 280kg/m$^3$ and a binder content of 1.5 to 6%. Suitable products are described in WO 03/042468 (which was our application filed by us even date herewith reference PRL04394WO claiming priority from EPA 01309600.3).

**[0019]** Another instance when it is particularly desirable to utilise the invention is when a batt is to be fixed against a non-planar surface, for instance a surface having surface irregularities with a depth of at least 3mm, and often 5 or 10mm or even 15mm. For instance it is known to be desirable to fit mineral wool batts against brickwork or other stone walls and these often have an irregular surface. In GB-A-1,306,225 it is proposed that a soft glass fibre panel can be applied to such a surface but this tends to be unsatisfactory since irregularities in the surface are then manifested in the wall, to some extent, in the first surface of the glass fibre panel. In practice any irregular surface on to which a bonded mineral fibre batt is to be secured is normally given a smoothing coat of plaster so as to provide a flat surface against which the batt can be secured firmly. This is wasteful of materials and time.

**[0020]** The invention provides a solution to this problem because the batt can now be secured firmly to the irregular surface since the soft outer portion will absorb the irregularities of up to, for instance 15mm, without causing the irregularities to be manifested in the first surface. Typically the batt has a density of 20 to 150, often 50 to 80 or 100, kg/m$^3$ and a thickness of 20 to 150mm, often 30 to 90mm.

**[0021]** It may have a dual density structure, with the outer portion being in the lower density layer for isntance as described in WO88/00265 or a triple layer, for instance as described in WO00/7360.

**[0022]** In general, the batt may have conventional structure and appearance except for the softened rear outer portion, which is typically 10 to 50mm, often 20 to 40mm, deep.

**[0023]** The softening can be increased by cutting (for instance to the desired depth of the softened portion) a check or other pattern into the outer portion prior to the mechanical compression.

**[0024]** The invention can also be applied to products where the softened portion itself has a relatively high binder content and/or a high fibre density. For instance it can have a binder content of above 1%, typically 2 to 6%, for instance 3 to 4 or 5%. It can have a density of above 100kg/m$^3$, often at least 160kg/m$^3$, up to 180 or even 250kg/m$^3$.

**[0025]** Broadly it is often preferred that the mineral fibre network which extends inwardly from the second face (and which may be all the second layer and part of the intermediate layer if present or just all or part of the second layer) has an inner portion and an outer portion wherein the second major face of the batt is provided by the outer face of the outer portion and wherein the outer portion has a depth of at least 5mm and is softer than the inner portion and merges with the inner portion through a transition portion of at least 5mm over which the stiffness increases gradually. Thus there is a softer or less stiff outer portion which merges gradually with a stiffer inner portion.

**[0026]** Stiffness for the purposes of this invention, can be considered to be modulus of elasticity (EN826), wherein an increasing numerical value for the modulus of elasticity indicates increasing stiffness. Preferably the stiffness of the outer portion is less than 90% of what the stiffness would have been if the network had not been fractured and most preferably it is less than 80% or even less than 70% of the stiffness of what the stiffness would have been if the network had not been fractured. It is usually at least 20%, and generally at least 40%, of what the stiffness would have been if the network had not been fractured.

**[0027]** The low stiffness, outer, portion generally has a depth of at least 10mm and often at least 10%, and preferably at least 20% or even 30% of the total thickness of the batt. The outer portion can constitute as much as, for instance, 70% or even 80% of the thickness of the batt.

## Claims

1. Use of a batt as insulation fitted against an irregular surface wherein the batt is a mineral fibre batt which has first and second major surfaces and which comprises a bonded mineral fibre network which is bonded by a cured bonding agent and which has an inner portion and an outer portion wherein the second surface of the batt is provided by the outer surface of the outer portion and wherein the outer portion has a depth of at least 5mm and has reduced stiffness due to post-cure compression of the bonded network in the outer portion and wherein the second face is compressed against the irregular surface and the soft outer portion absorbs the irregularities without causing the irregularities to be manifested in the first surface.

2. A use according to claim 1, in which the reduced stiffness in the outer portion is due to fracturing of the bonded network in the outer portion.

3. A use according to claim 1 or claim 2, wherein the batt comprises a first layer bonded by a bonding agent and which extends inwardly from the first sur-

face and one or more intermeshed layers each comprising a bonded mineral network bonded by a bonding agent and wherein the first face of the batt is the outer surface of an outer layer which has higher density than the other layers.

**Patentansprüche**

1. Verwendung einer Fasermatte als Wärmedämmung, die an einer unregelmäßigen Oberfläche angebracht ist, wobei es sich bei der Fasermatte um eine Mineralfaserfasermatte handelt, die eine erste und eine zweite Hauptoberfläche aufweist und die ein gebundenes Mineralfasernetz umfasst, das mit einem ausgehärteten Bindemittel gebunden ist, und die einen inneren Abschnitt und einen äußeren Abschnitt aufweist, wobei die zweite Oberfläche der Fasermatte von der äußeren Oberfläche des äußeren Abschnitts bereitgestellt wird, und wobei der äußere Abschnitt eine Tiefe von mindestens 5 mm aufweist und infolge von Stauchen nach dem Aushärten des gebundenen Netzes eine verringerte Steifigkeit in dem äußeren Abschnitt aufweist, und wobei die zweite Oberfläche an der unregelmäßigen Oberfläche gestaucht ist und der weiche äußere Abschnitt die Unregelmäßigkeiten aufnimmt, ohne zu bewirken, dass die Unregelmäßigkeiten in der ersten Oberfläche erkennbar werden.

2. Verwendung nach Anspruch 1, wobei die verringerte Steifigkeit in dem äußeren Abschnitt infolge des Brechens des gebundenen Netzes in dem äußeren Abschnitt ist.

3. Verwendung nach Anspruch 1 oder Anspruch 2, wobei die Fasermatte eine erste, mit dem Bindemittel gebundene Schicht, die sich von der ersten Oberfläche nach innen erstreckt, und eine oder mehrere vermaschte Schichten, die jeweils ein gebundenes Mineralnetz, das mit einem Bindemittel gebunden ist, umfassen, und wobei es sich bei der ersten Oberfläche der Fasermatte um die äußere Oberfläche eine äußeren Schicht handelt, die eine höhere Dichte aufweist als die anderen Schichten.

**Revendications**

1. Utilisation d'une nappe comme isolant posé contre une surface irrégulière, où la nappe est une nappe constituée de fibres minérales qui a une première et une deuxième surfaces majeures et comprend un réseau lié de fibres minérales qui est lié par un agent liant durci et présente une portion interne et une portion externe, où la deuxième surface de la nappe est fournie par la surface externe de la portion externe et où la portion externe a une profondeur de 5 mm au moins et une rigidité réduite due à une compression post-durcissement dans la portion externe du réseau lié, la deuxième face étant comprimée contre la surface irrégulière et la portion externe souple absorbant les irrégularités sans causer un transfert des irrégularités dans la première surface.

2. Utilisation selon la revendication 1, dans laquelle la rigidité réduite de la portion externe est due à une fracture du réseau lié dans la portion externe.

3. Utilisation selon la revendication 1 ou la revendication 2, où la nappe comprend une première couche liée par un agent liant qui se prolonge vers l'intérieur à partir de la première surface et une ou plusieurs couches interconnectées comprenant chacune un réseau minéral lié qui est lié par un agent liant, et où la première face de la nappe est la surface externe d'une couche externe ayant une densité plus élevée que les autres couches.

## REFERENCES CITED IN THE DESCRIPTION

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