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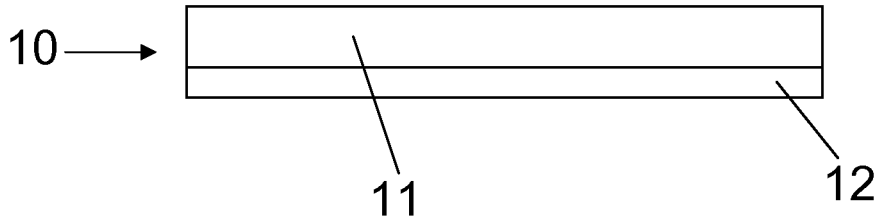
(54) Thermal insulation product

(57) A mineral fibre insulation product comprises a mineral wool blanket and a facing secured to a surface of the blanket, the facing consisting essentially of a plastics sheet having a thickness in the range 5-100 μm secured to the mineral wool blanket.

Fig 1



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Description

[0001] This invention relates particularly to thermal insulation products and to facings.

[0002] The invention is particularly useful in relation to an insulation product which comprises a blanket of mineral fibres, for example glass fibres or stone wool fibres. The fibres of such products are generally held together by a binder dispersed within the blanket. The mineral fibre insulation may be used as thermal and/or acoustic insulation, for example for buildings, or as insulated ducting, for example in heating or air conditioning systems.

[0003] Insulation products of this type are generally provided either as continuous lengths generally packaged as a roll or individual panels, or batts. A facing is often provided on one or both major surfaces of the insulation product.

[0004] Depending upon the intended use, the facing can be permeable or provide a gas and/or vapour barrier, and/or have other functionalities including an encapsulation function and/or a reinforcing function and/or provide a soft touch or feel to the product.

[0005] One commonly used facing consists of a sheet of kraft paper having a weight in the range 50-70 g/m^2 secured to the insulation using an adhesive. Another commonly used facing consists of a laminated aluminium/kraft paper sheet.

[0006] According to one aspect, the present invention provides a mineral fibre insulation product as defined in claim 1. Other aspects are defined in other independent claims. Dependent claims define preferred and/or alternative embodiments.

[0007] The thickness of the continuous plastics sheet (s) of the facing is preferably in the range 5 - 30 μm; it may be in the range 10 - 20 μm. It may be significantly lower in thickness than the 120 μm thickness commonly used for kraft paper facings. It may, even at these lower thicknesses, provide equivalent or indeed improved vapour barrier performance.

[0008] The ability to use a lower thickness of facing whilst providing desired levels of performance may provide advantages to the product and/or to its manufacture.

[0009] For example:

- The facings may be more flexible and/or supple than previously used facings. This may allow the facing to conform better to the surface of the mineral wool blanket making it easier to apply the facing to the blanket and/or improving adhesion between the facing and the blanket and/or allowing reduced quantities of adhesive to be used to achieve equivalent bonding.

- The ability to use a thin facing may enable rolls of facing used in manufacture to have greater lengths of facing for the same diameter of rolls. This may allow the rolls of facing to be changed less frequently during manufacture of the product.

- The flexibility of the facing may improve the way it conforms to the surface of a heated roller when this is used to heat an adhesive provided on the facing; this may improve heat transfer and be particularly beneficial at high manufacturing line speeds

[0010] The facing may be secured to the mineral wool blanket using solvent-based, water-based or hot melt adhesives applied to the facing material or to the surface of the mineral wool blanket. Preferably, the facing comprises hot melt adhesive, provided on the continuous plastics sheet. The hot melt adhesive may comprise or consist essentially of a polyethylene (PE).

[0011] The adhesive may be provided on the facing in the form of a layer; it may be a continuous layer. Arranging for the adhesive to extend over substantially the entire surface of the insulation product and/or the facing may enable the adhesive to provide or contribute to providing a vapour barrier, particularly a barrier to water vapour. Use of a polymer as the adhesive may be particularly advantageous in this respect, notably a polyethylene.

[0012] Alternatively, the adhesive may be provided in the form of bands or strips, for example strips of adhesive having a width greater than 5, 10 or 15mm and/or less than 60, 50, 40, 30 or 25 mm; such strips may be spaced by a distance greater than 20, 30 or 40 mm and/or less than 100, 80 or 60 mm. The use of discontinuous areas of adhesive may reduce the total quantity of adhesive used.

[0013] In addition to cost considerations, a reduced quantity of adhesive may improve fire and/or flame retarding properties; adhesives can be detrimental to the flame performance of mineral wool insulating products.

[0014] The adhesive may be co-extruded with the facing material.

[0015] Preferably, the facing consists of a single continuous sheet of PET (polyethylene terephtalate) provided with a layer of adhesive, particularly a polyethylene (PE).

[0016] The PET may provide a desired combination of properties including tear resistance and/or water vapour impermeability and/or heat resistance, particularly at the desired thicknesses.

[0017] The facing preferably consists essentially of a PET layer secured to the mineral wool blanket with an adhesive, that is to say that, in this case, apart from the PET layer and the adhesive there are no other elements comprised within the facing which materially affect the basic and novel characteristic(s) of the claimed invention. In particular, there is no fibrous reinforcing scrim layer present in this embodiment of the invention, such a layer having been found to be unnecessary and undesirable in this embodiment. However, the PET layer in this embodiment may be coloured or provided with a reflective surface.

[0018] The facing may consist of the PET layer secured to the mineral wool blanket with an adhesive.

[0019] In some embodiments, the facing may com-

prise a continuous sheet of polypropylene provided with adhesive.

[0020] The facing may be secured to the insulation product by heat softening a thermoplastics material such as a synthetic polymer layer on one surface of the facing and then pressing this against the mineral wool blanket. In this case, the adhesive layer on the facing is generally heated by passing the facing over one or more heated rollers, for example rollers supplied with heated oil and heating the adhesive through the facing. The ability to use a relatively thin facing may facilitate this process and/or aid heat transfer to the adhesive and/or limit the risk of heating deteriorating the facing. The use of PET as the facing layer, especially where the facing consists essentially of a layer of PET and the adhesive, is particularly advantageous in this respect as PET transmits heat better that other potentially possible materials. Furthermore, the melting point of PET, more particularly the difference in melting point between PET and the preferred hot melt adhesives, facilitates the application of a PET facing to a mineral wool blanket.

[0021] Particularly where the adhesive is a hot melt adhesive, it may have a melting point in the range 60°C to 200°C, more particularly 80°C to 120°C.

[0022] Particularly where the adhesive forms a substantially continuous film, it may be used at a weight of greater than 5 g/m^2 and/or less than 30, 20 or 15 g/m^2. It has been common practice with prior art facings to use 20-30 g/m^2 of adhesive in order to provide sufficient adhesion. An advantageous aspect of certain embodiments of the invention is thus the ability to provide sufficient adhesion using less adhesive than equivalent prior art systems, for example to use 5-15 g/m^2 of adhesive.

[0023] The plastics sheet of the facing is continuous, that is to say that it comprises a substantially continuous material as opposed to being made of woven or nonwoven fibres having interstices between the material making up the sheet. The facing may be perforated or microperforated, for example when it is desired to allow the passage of water vapour.

[0024] The facing and/or one or more of its constituent parts, may comprises a fire or flame retardant. The insulation product may have a fire rating of A2 in accordance with EN 13501

[0025] The continuous plastics sheet may be metallised, for example, with aluminium. This may provide a reflective surface; it may contribute to the thermal performance of the insulating product. The facing, particularly the continuous plastics sheet, may be coloured, for example, by incorporation of a pigment or filler. It may be black in colour; alternatively, it may be transparent.

[0026] The facing may be applied to only one major surface of the insulating product; this may be the upper or lower surface during manufacture. The facing may be applied to both major surfaces of the insulating product. It may cover one or more side surfaces of the insulating product.

[0027] The insulation product may be a mineral wool blanket, for example having a thickness of approximately 20 to 300 mm, especially 60 to 260 mm, and a bulk density of 8 to 45 kg/m^3 (0.5 to 2.5 pcf), for example approximately 12 kg/m^3 (0.75 pcf).

[0028] According to another of its aspects, the present invention provides a mineral fibre insulation assembly comprising two abutting mineral wool blankets each mineral wool blanket comprising a facing having an external plastics surface and a plastics tape joining the two blankets together across their abutting edge by being adhered to the external plastics facing of each blanket.

[0029] This arrangement is particularly advantageous where it is desired to provide a vapour barrier with the facings providing a vapour barrier over the surfaces of the mineral wool blankets and the tape providing a vapour barrier at the abutting edges of the blankets.

[0030] The tape may comprise a plastics film provided with a layer of adhesive, for example a plastics film comprising of consisting of a PET, a polypropylene, a polyethylene and a mixed polypropylene-polyethylene with an adhesive based on an acrylic.

[0031] The interaction of such a film with the external plastics surface of the mineral wool blankets, particularly when these are PET, provides particularly good sealing and durability and avoids problems that have been encountered when attempting to join eg kraft paper faced mineral wool blankets using similar tapes.

[0032] The facing may be provided at at least one or at single surface of the mineral wool blanket, preferably at a major surface of the mineral wool blanket. The facing may cover substantially the entire surface area of a major surface of the mineral wool blanket. The facing may be commensurate with the major surface of the blanket, that is to say, the facing may extends over substantially the entire surface area of a major surface of the blanket without extending substantially beyond this surface area. This may facilitate abutment of adjacent mineral wool blankets. Alternatively, the facing may extends beyond one edge, preferably beyond a single edge, of the mineral wool blanket to form a projection or flange. Such a flange may facilitate providing an overlap of the facings of adjacent mineral wool blankets and/or providing an extension of the facing which may extent over a beam, stud or other obstruction which prevents direct abutment of adjacent mineral wool blankets. Such flanges, extensions or projections of the facing are particularly useful in configurations in which it is desirable to provide continuity in a vapour barrier provided by facings of adjacent mineral wool blankets.

[0033] Embodiments of the invention are described below by way of example only with reference to

Fig. 1: an enlarged cross section of a facing;

Fig. 2: a schematic representation of the manufacture of an insulation product;

Fig 3a: a schematic cross-section of a mineral fibre insulation product;

Fig 3b: a schematic representation of a mineral fibre

insulation assembly;

Fig 4a: a schematic cross-section of an alternative mineral fibre insulation product;

Fig 4b: a schematic representation of an alternative mineral fibre insulation assembly; and

Fig 5: a schematic representation of a further mineral fibre insulation assembly.

[0034] The facing 10 represented in Fig 1 is a PET (17 μm thick) /low density polyethylene (9 g/m^2) assembly, the polyethylene film 12 being secured to the continuous PET film 11. It may be made by co-extrusion. An alternative thickness for the PET is about 12 μm.

[0035] The quantity of adhesive is significantly lower than the 30 g/m^2 generally used to secure kraft paper facings to mineral wool.

[0036] The facing 10 may be provided on a roll 21 (typically 1.2 m - 2.4 m wide) and pass over an oil heated roller 22 so that its adhesive is brought in to contact with a mineral wool blanket 23 which has been cured and is moving along a production line (typically at about 15-70 m/min) on a series of conveying rollers 24. The heated roller 22 having a surface temperature of about 180 °C softens the PE adhesive through the PET film and the melted PE adhesive is pressed against the mineral wool blanket 23 between a rotating pressing belt 25 and the conveying rollers 24 to adhere the facing to the mineral wool blanket 23. The low density polyethylene (LDPE) preferably reaches a temperature of about 110 °C ± 5°C.

[0037] Subsequent to application of the facing(s), the insulation product is cut and/or packaged.

[0038] In an alternative embodiment, a PET is used having a thickness of 12 μm, preferably with a flame retardant polyolefin.

[0039] Where the pressing belt or other pressing surface(s) have a dimpled pattern, the suppleness of the facing may cause the dimpled pattern to be reproduced in the facing when adhered to the mineral wool blanket.

[0040] In one embodiment, illustrated in Fig 3a, the mineral fibre insulation product comprises a mineral wool blanket 31 and a facing 33 secured to a major surface of the blanket 31. In this embodiment, the facing 33 is commensurate with the major surface of the blanket, that is to say, the facing 33 extends over substantially the entire surface area of the major surface of the blanket 33 without extending substantially beyond this surface area. For ease of representation, the adhesive is not shown separately from the facing film in this or subsequent figures.

[0041] Fig 3b illustrates an assembly 30 comprising two abutting mineral wool blankets 31,32, of the type illustrated in Fig 3a, each mineral wool blanket comprising a plastics facing 33,34 secured to a surface of the blanket which provides a vapour barrier. A plastics tape 35 having a layer of adhesive provided on its underlying face is using to join the two mineral wool blankets together where they abut by being adhered to the facing of each blanket. The contact between the adhesive of the tape and each of the facings provides a durable connection which, in combination with the tape, provides continuity in the vapour barrier across the surface of the assembly.

[0042] In the embodiment illustrated in Fig 4a, the facing 43 covers substantially the entire surface area of a major surface of the mineral wool blanket 41 but also extends beyond one edge 47 of the blanket to form a projection or flange 48.

[0043] This flange 48 runs along the entire length of the edge 47 of the blanket.

[0044] Fig 4b illustrates an assembly using the Fig4a insulation product in which mineral wool blankets 41, 42 are arranged on either side of a wooden beam or stud 45.

[0045] The flanges 48 of the facing 43, 44 of each blanket are arranged to project across the wooden beam 45 and a length of adhesive tape 46 is used to join the facings 43, 44 together at least partially over the wooden beam 45. The flanges 48 may overlap each other in such an arrangement or, as illustrated, there may be a space between the edges of the flanges. The combination of the flanges 48 and the tape 46 provides a convenient way of providing continuity in a vapour barrier provided by the facings 43,44 where there is a structural member or other discontinuity between two adjacent mineral wool blankets 41,42.

[0046] In the embodiment illustrated in Fig 5, the flanges 58, 59 of the facing sheets 53,54 are arranged to project in the same direction such that the flange 58 associated with one mineral wool blanket 51 overlaps and lies at least partially on top of the facing 54 of an adjacent mineral wool blanket 52. Tape 56 (shown raised above the facings 53,54 for clarity) is used to secure the flange 58 of one facing 53 to the facing 54 of the adjacent mineral wool blanket 52. This facilitates providing continuity in the vapour barrier provided by the facings across adjacent mineral wool blankets. The overlapping of the flange 58 with the facing 54 of the adjacent mineral wool blanket may enhance the vapour barrier effect, for example, even if the tape used in vapour permeable (for example a paper tape provided with an vapour permeable adhesive) or partially vapour permeable (for example, a paper tape provided with a partially permeable adhesive).

Claims

1. A mineral fibre insulation product comprising a mineral wool blanket and a facing secured to a surface of the blanket **characterised in that** the facing has a thickness in the range 5-100 μm and consists essentially of a PET sheet secured to the mineral wool blanket by an adhesive.

2. A mineral fibre insulation product in accordance with claim 1, in which the PET sheet of the facing has a thickness in the range 5 - 30 μm.

3. A mineral fibre insulation product in accordance with claim 1 or claim 2, in which the adhesive is a hot melt

adhesive.

4. A mineral fibre insulation product in accordance with any of claims 1 to 3, in which the adhesive is provided as a substantially continuous film on the PET sheet of the facing.

5. A mineral fibre insulation product in accordance with any of claims 1 to 3, in which the adhesive is provided as strips on the PET sheet of the facing.

6. A mineral fibre insulation product in accordance with any preceding claim, in which the adhesive comprises a polyethylene.

7. A mineral fibre insulation product in accordance with any preceding claim, in which the PET film of the facing and the adhesive are coextruded.

8. A mineral fibre insulation product in accordance with any preceding claim, in which the facing provides a vapour barrier.

9. A mineral fibre insulation product in accordance with any of claims 1 to 7, in which the facing is perforated and allows passage of water vapour.

10. A mineral fibre insulation product in accordance with any preceding claim, in which the mineral fibre insulation product has a fire rating of at least A2.

11. A mineral fibre insulation product in accordance with any preceding claim, in which the facing covers substantially the entire surface area of a major surface of the mineral wool blanket and comprises a flange which projects beyond one edge of the mineral wool blanket.

12. A mineral fibre insulation product facing having a thickness in the range 5-100 μm and consisting essentially of a continuous plastics sheet of PET provided with a polyelethylene adhesive in the form of a substantially continuous layer of adhesive or in the form of strips.

13. A mineral fibre insulation assembly comprising two adjacent mineral wool blankets, each mineral wool blanket comprising a facing secured to a surface of the blanket **characterised in that**

- the facing of each mineral wool blanket provides a vapour barrier and comprises a plastics film at its external face, and **in that**
- the assembly comprises a plastics tape provided with an adhesive on one of its sides, the tape being arranged to adhere the plastics film at the external face of one facing to the plastics film at the external face of the facing of the adjacent mineral wool blanket.

14. A mineral fibre insulation assembly in accordance with claim 13, in which each mineral wool blanket is a mineral wool blanket in accordance with any one of claims 1 to 11.

15. A mineral fibre insulation assembly in accordance with claim 13 or claim 14, in which the tape provides continuity in the vapour barrier provided by the facings of adjacent mineral wool blankets.

Fig 1

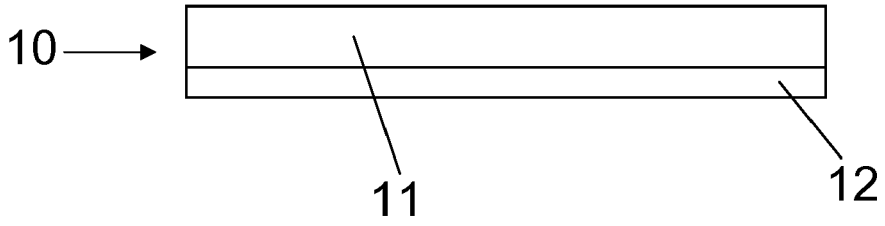

Fig 2

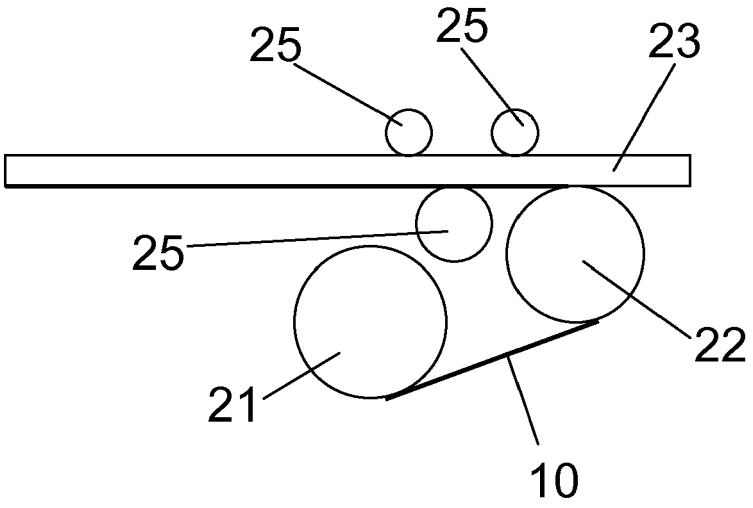

Fig 3a

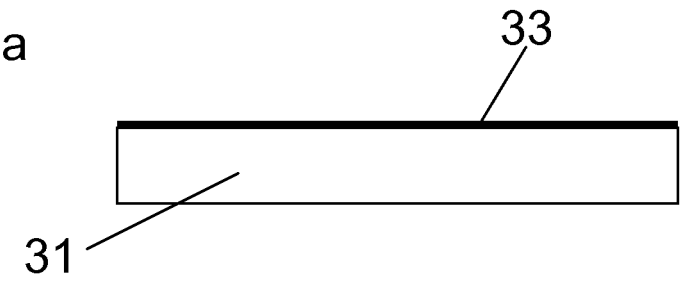

Fig 3b

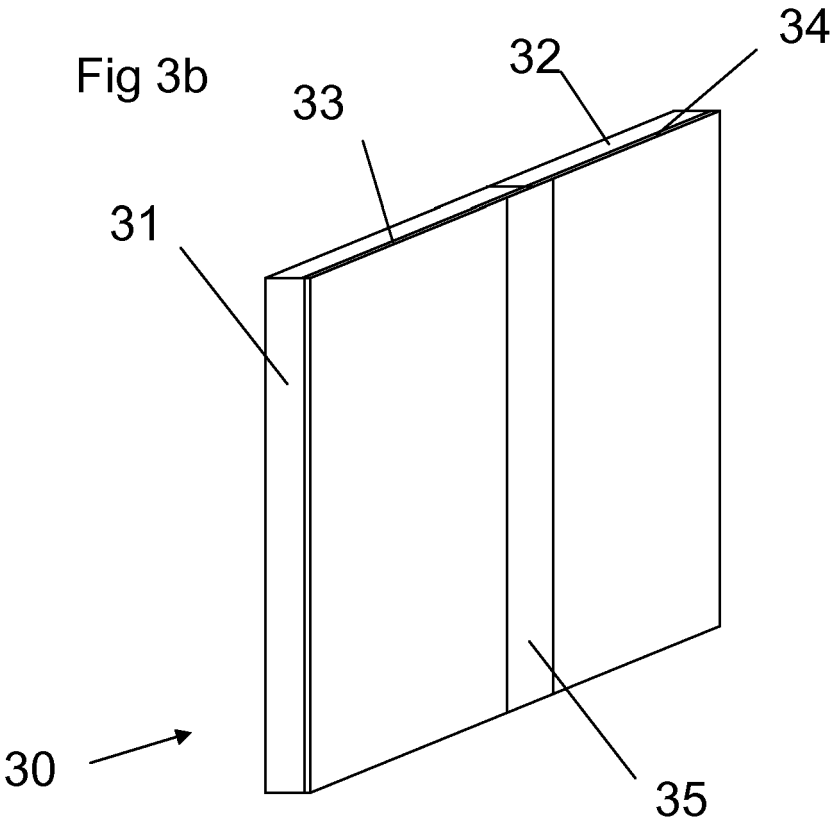

Fig 4a

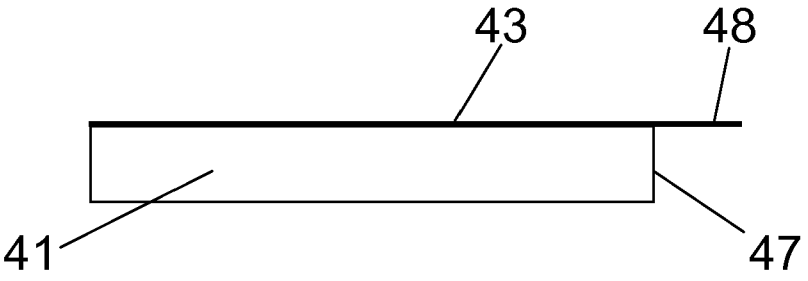

Fig 4b

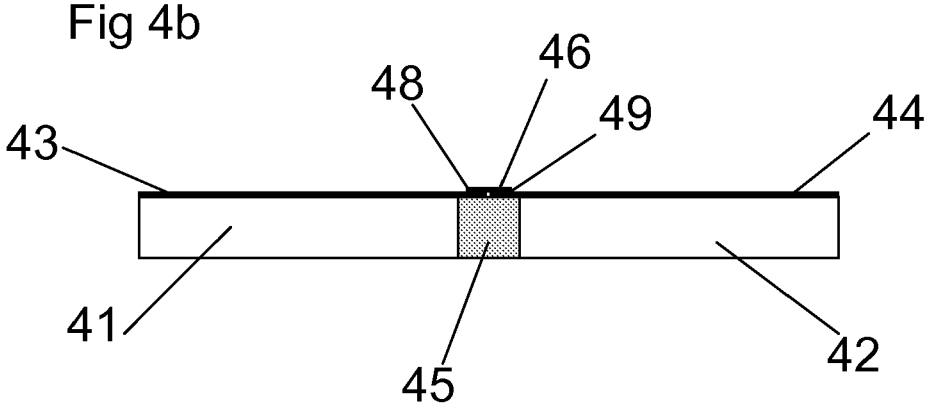

Fig 5