

Composite Film

The invention relates to the use of a composite film made up of several layer-like materials.

In particular, the invention relates to the use of a composite film suitable for laminating and sheathing, respectively, insulating materials, particularly insulating materials for installation tubes, insulating materials for covering containers of different natures and insulating materials for coating panels.

At present, such insulating materials are clad, for example, with aluminium or galvanized steel sheets having a thickness of approx. 0.6 to 1.00 mm. The disadvantage of those thick sheet metals is their inflexibility. Mechanical damage to sheet metals such as, e.g., dents remain permanently in the material. The material costs are relatively high, and problems arise also during the processing of such materials particularly due to the high weight. A further disadvantage which must be mentioned is that the sheet metals can always be applied onto the insulating material only later, for example, on site.

A covering with rigid PVC films is known as well; however, it is not weather-resistant. A covering with an aluminium film, which is likewise known, exhibits the same disadvantage of low weathering resistance.

Furthermore, for the insulation of insulating materials, a composite film has already been provided which includes a film of polyethylene terephthalate (PET) as an outer layer, an inner layer of a polypropylene material (PP) and a film of aluminium located between the inner and outer layers. This composite film also has the disadvantage of low weathering resistance.

In the Austrian Utility Model AT 7931 U, a composite film is described which is made up of several layer-like materials containing at least

- a) a layer of light- and weather-resistant plastic forming the exterior of the film,
- b) a main layer of thermoplastic polymer, and
- c) a layer arranged between layer a) and layer b) and having water vapour barrier properties.

According to said document, the main or support layer b) preferably consists essentially of rigid polyvinyl chloride (PVC) films.

In the documents EP 1 344 875 A2, DE 298 01 546 U1, DE 19 27 377 U and DE 19 44 317 U, the use of various materials in the field of vapour barrier webs for roofs is described.

WO 2004/098879 A1 describes the use of a fibre fleece composite element in inner parts of automobiles.

EP 0 167 956 A2 describes a composite grid film and its use as a packaging material.

DE 20 2005 007653 U describes an insulating element containing a fibre mat and a metal foil designed as a lamination thereof.

From WO 97/22838, an absorber film for solar heat collectors is known.

It is the object of the present invention to overcome the disadvantages of the prior art and to provide a material which is better suited for being applied onto insulating materials in the open.

Said object is achieved by using a composite film according to claims 1 to 14 for application onto an insulating material.

It has been shown that the composite film defined in claims 1 to 14 is suitable in an excellent manner for application onto an insulating material, for example, for laminating and sheathing, respectively, insulating materials, particularly insulating materials for installation tubes, insulating materials for covering containers of different natures and insulating materials for coating panels.

Thereby, it has surprisingly been found that a glass fabric or a glass-fibre fleece is excellently suitable as a support layer b) in contrast to the composite film described, e.g., in AT 7931 U.

Glass fabrics or glass-fibre fleeces have a great advantage over synthetic materials which so far have been used as a support layer b) in that they are virtually non-flammable and the resulting composite film thus exhibits a lower flammability. Materials made of glass fabrics or glass-fibre fleeces are also characterized by a high temperature stability; in case of combustion, no or only a minimum formation of noxious gases can be observed – in contrast to synthetic materials.

In a preferred embodiment of the invention, the glass fabric or the glass-fibre fleece has a mass per unit area of 40 g/m^2 to 600 g/m^2 , preferably of 150 g/m^2 to 250 g/m^2 , particularly preferably of around 200 g/m^2 .

The thickness of the support layer b) can be from 20 to $500 \text{ }\mu\text{m}$, preferably from 100 to $300 \text{ }\mu\text{m}$, particularly preferably around $200 \text{ }\mu\text{m}$.

The glass filaments forming the glass fabric or the glass-fibre fleece, respectively, can have a yarn count of from 11 to 2400 tex.

Particularly preferably, a glass fabric composed of glass filaments of type EC 9-68 (an E-glass according to DIN 1249 Part 1 having a yarn count of 68 tex) is used as the support layer b).

The filaments of the glass fabric are interwoven preferably in a plain weave. The use of glass fabrics in a twill weave is also possible.

The glass fabric may be provided with a conventional finishing, in particular a so-called „weave lock finish“.

The glass fabric or glass-fibre fleece used as the support layer b) may be coloured. Preferably, the glass fabric or glass-fibre fleece used is white.

A particularly preferred embodiment of the present invention has as the support layer b) a glass fabric of type 7628 having a mass per unit area of approx. 200 g/m^2 , a thickness of approx. $200 \text{ }\mu\text{m}$, consisting of glass filaments of type EC 9-68 in a plain weave and provided with a „weave lock“ finishing.

As known per se from the Austrian Utility Model AT 7931 U, the composite film used according to the invention has numerous advantages due to the combination of several layers: Because of the outer layer a), the film is stable to light exposure and also weather-resistant. Hence, the outer layer a) also acts as a corrosion protection for layer c).

The layer a) is preferably a coating, a lacquer coat or a film and may optionally be coloured. In particular, the layer a) can consist essentially of a material selected from the group consisting of coatings based on silicone, acrylic lacquers, nitrocellulose lacquers and films

made of polyethylene terephthalate and low-density polyethylene finished so as to be UV-resistant, or mixtures thereof, respectively.

The layer c) serves as a water vapour barrier and hence as a further protection for the insulating material onto which the composite film is applied. The layer c) is preferably a metal layer and/or a metallized layer of plastic, in particular an aluminium film or an aluminium layer applied by vapour deposition, respectively.

The layer b) provides the composite film in particular with the required resistance to mechanical influences.

In a preferred embodiment of the composite film used according to the invention, the thickness of the support layer b) is 40% to 95%, preferably at least 70%, particularly preferably at least 80%, of the total thickness of the composite film. The required dimensional stability, in particular against dents, stiffness, tear strength, puncture resistance and tensile impact strength can therewith be ensured in a particularly good manner.

The thickness of layer c) may range preferably from 5 to 50 μm , particularly preferably to 20 μm , in particular from 9 to 12 μm .

The thickness of layer a) may range preferably from 10 to 35 μm or from 5 to 30 g/m^2 , respectively.

Preferably, the composite film consists essentially of the layers a), b) and c). This means that, apart from possible necessary adhesive layers, the composite film has no further material layers between the layers a), b) and c).

The total thickness of a composite film consisting of layers a), b) and c) preferably ranges from 50 μm to 800 μm .

However, the composite film used according to the invention may also comprise further layers. For example, an additional sealing layer or, underneath layer b) on the side of the insulating material, a layer of an adhesive substance may be applied which optionally is provided with a removable film in order to be able to apply the composite film used according to the invention onto the insulating material. A further possibility is to provide an aluminium layer underneath layer b) on the side of the insulating material.

In a further preferred embodiment, the composite film used according to the invention contains at least one further layer e) of thermoplastic polymer, particularly consisting of a material selected from the group consisting of polypropylene, polyvinyl chloride, low-density polyethylene, polyethylene terephthalate and polystyrene or mixtures thereof, respectively.

From the Austrian Utility Model AT 7931 U, it is known to provide a layer made of a thermoplastic polymer. A composite film containing such a layer in combination with the insert according to the invention of a layer made of a glass fabric or a glass-fibre fleece has a good restoring force, whereby possible dents and the like forming, e.g., during the assembly of the composite film or the insulating material, respectively, are levelled out.

The layer e) is preferably arranged between layer b) and layer c).

In particular, two layers c') and c'') may be provided between which layer e) is arranged. The layer b) is then provided underneath the second layer c'') on the side of the insulating material.

The individual layers of the composite film used according to the invention may be interconnected by conventional adhesives, e.g., hotmelt adhesives. Two-component adhesives based on polyurethane which are finished by the addition of additives so as to be UV-, weather- and water-resistant are particularly suitable. Delamination of individual layers can thereby be prevented.

The composite film used according to the invention may likewise be manufactured, for example, by coating a prefabricated compound of layers a) and c) with the support layer b).

When the composite film used according to the invention is applied onto an insulating material or when an insulating material provided with the composite film used according to the invention is applied onto a tube, respectively, individual portions of the film or the insulating material, respectively, can be interconnected in a manner known per se, for example, by overlapping the margins and by sticking or welding them together, respectively.

The composite film used according to the invention can be applied onto the insulating material already in the factory or can be attached to the insulating material afterwards on site.

Below, the invention is illustrated in further detail by figures and exemplary embodiments:

Fig. 1 schematically shows an embodiment of the composite film used according to the invention.

Fig. 2 also schematically shows the embodiment according to Fig. 1, in which the adhesive layers are illustrated.

Fig. 3 shows an embodiment having an additional plastic layer e).

Fig. 4 schematically shows the application of the composite film used according to the invention onto an insulating material.

Example 1:

Fig. 1 schematically shows an embodiment of the composite film used according to the invention on a greatly enlarged scale, wherein a composite film 1, consisting essentially of the weather-resistant outer layer a, the support layer b and the water vapour barrier layer c, is illustrated.

In the illustration according to Fig. 2, the adhesive layers d' and d'' are depicted more clearly (on an extremely enlarged scale).

The outer layer a) consists of PET finished so as to be UV-resistant and having a thickness of 19 μm . The layer c) is an aluminium film 12 μm in thickness. The layer b) is a glass fabric of type 7628 having a mass per unit area of approx. 200 g/m^2 , a thickness of approx. 200 μm , consisting of glass filaments of type EC 9-68 in a plain weave and provided with a „weave lock“ finishing.

The layers are bonded to each other in a manner known per se by a two-component adhesive based on polyurethane, which is finished so as to be UV-resistant and resistant to weather and atmospheric conditions, respectively (adhesive layers d' and d'').

Example 2:

Fig. 3 shows the structure of a further embodiment of the composite film used according to the invention which comprises an additional layer e of thermoplastic polymer which is

arranged between two aluminium films c' and c'' (the adhesive layers are not depicted in this figure).

In a preferred embodiment, the layer e has a thickness of 140 μm and consists of polyvinyl chloride whereas the layer b) is a glass fabric according to Example 1 and has a thickness of approx. 200 μm . The two aluminium layers c' and c'' each have a thickness of 9 μm .

Example 3:

Fig. 4 schematically depicts a possible application of the composite film 1 used according to the invention onto an insulating material 3 covering a tube 2. The film 1 is placed around the insulating material 3. At the overlapping point of the film layers, the wrapping is sealed, for example, by a rivet 4.

Claims:

1. The use of a composite film (1) made up of several layer-like materials (a, b, c) containing at least
 - a) a layer of light- and weather-resistant plastic forming the exterior of the film,
 - b) a support layer, and
 - c) a metal layer and/or a metallized layer of plastic having water vapour barrier properties arranged between layer a) and layer b),wherein the support layer b) is a glass fabric or a glass-fibre fleece, for application onto an insulating material.
2. The use according to claim 1, characterized in that the glass fabric or the glass-fibre fleece has a mass per unit area of 40 g/m^2 to 600 g/m^2 , preferably of 150 g/m^2 to 250 g/m^2 , particularly preferably of around 200 g/m^2 .
3. The use according to claim 1 or 2, characterized in that the thickness of the support layer b) is from 20 to $500 \text{ }\mu\text{m}$, preferably from 100 to $300 \text{ }\mu\text{m}$, particularly preferably around $200 \text{ }\mu\text{m}$.
4. The use according to any of the preceding claims, characterized in that a glass fabric composed of glass filaments of type EC 9-68 is used as the support layer b).
5. The use according to any of the preceding claims, characterized in that a glass fabric whose filaments are interwoven in a plain weave is used as the support layer b).
6. The use according to any of the preceding claims, characterized in that a glass fabric provided with a finishing, in particular a weave lock finish, is used as the support layer b).
7. The use according to any of the preceding claims, characterized in that the layer a) is a coating, a lacquer coat or a film.
8. The use according to any of the preceding claims, characterized in that the layer a) consists essentially of a material selected from the group consisting of coatings based on silicone, acrylic lacquers, nitrocellulose lacquers and films made of polyethylene

terephthalate and low-density polyethylene finished so as to be UV-resistant, or mixtures thereof, respectively.

9. The use according to any of the preceding claims, characterized in that the layer c) is an aluminium film or an aluminium layer applied by vapour deposition.
10. The use according to any of the preceding claims, characterized in that the thickness of the support layer b) is 40% to 95%, preferably at least 70%, particularly preferably at least 80%, of the total thickness of the composite film.
11. The use according to any of the preceding claims, characterized in that the composite film consists essentially of the layers a), b) and c).
12. The use according to any of claims 1 to 10, characterized in that the composite film contains at least one further layer e) of thermoplastic polymer, particularly consisting of a material selected from the group consisting of polypropylene, polyvinyl chloride, low-density polyethylene, polyethylene terephthalate and polystyrene or mixtures thereof, respectively.
13. The use according to claim 12, characterized in that the layer e) is arranged between layer b) and layer c).
14. The use according to claim 13, characterized in that two layers c') and c'') are provided between which layer e) is arranged.
15. An insulating material exhibiting on the exterior a composite film according to any of claims 1 to 14.