

(19) **DANMARK**



Patent- og
Varemærkestyrelsen

(10) **DK/EP 2055865 T3**

(12) Oversættelse af
europæisk patentskrift

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- (51) Int.Cl.: **E 04 H 15/20 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2021-03-29**
- (80) Dato for Den Europæiske Patentmyndigheds
bekendtgørelse om meddelelse af patentet: **2021-03-10**
- (86) Europæisk ansøgning nr.: **08019215.6**
- (86) Europæisk indleveringsdag: **2008-11-03**
- (87) Den europæiske ansøgnings publiceringsdag: **2009-05-06**
- (30) Prioritet: **2007-11-02 DE 202007016990 U**
- (84) Designerede stater: **AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC
MT NL NO PL PT RO SE SI SK TR**
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- (54) Benævnelse: **Bygningsafskærmningselement**
- (56) Fremdragne publikationer:
EP-A1- 0 106 920
DE-A1-102005 058 712
DE-U1- 20 217 990

The invention relates to a building covering element with a film cushion, which comprises an outer foil layer forming the outside of a building covering and an inner foil layer forming the inside of a building covering, which between them form an at least essentially fluid-tight closed cavity, which contains fluid medium, in particular air, and with a reinforcing element.

Building covering elements are known for use in foil roof systems and foil façade systems. Said foil roof and foil façade systems can preferably be used in the construction of commercial buildings, such as sports stadiums, event centres or shopping centres. In these buildings, which mostly have very large roof and façade surface areas, the advantages associated with foil roof or foil façade systems are made use of, such as their lightness and translucence or the ability to vary their colour scheme.

Generally film cushions consist of two outer foil layers, which are joined together in an essentially fluid-tight manner and are usually welded together along their edges in order to form an essentially fluid-tight closed cavity between them. During the manufacture of the film cushion a fluid medium is introduced into this cavity, in particular a gas such as e.g. air, whereby the foil layers are tensioned accordingly and the film cushion is given its intended form. When installed the film cushions are also mostly provided with a device for supplying fluid medium, by means of which the air pressure in the film cushion can be controlled.

However, the fluid medium introduced into the film cushion is not only used for shaping the cushion but also for thermal insulation, which is a further advantage of foil systems.

In order to withstand pressures that affect a building covering, such as for example wind pressures, and here in particular wind suction, existing solutions provide a double outer foil layer. As a result of this double layer, a film cushion can absorb higher pressures, in particular wind suction. However, the disadvantage here is mainly the high use of material, which can mean high costs, especially in building coverings with large surface areas. Although the two outer foil layers are joined to one another to be essentially fluid-tight, it is more often the case that condensate forms between these two foil layers, which is undesirable for optical reasons.

Document DE 202 17 990 U1 discloses a building covering element according to the preamble of claim 1.

It is therefore an objective of the present invention to improve a building covering element of the aforementioned kind such that at least one of the said disadvantages is reduced.

5 Said objective is achieved by a building covering element according to the independent claim 1.

The reinforcing element is given its load-absorbing function by means of coupling to the outer foil layer via the pressurised fluid medium. Therefore, the formation of pressure in the chambers is significant for improving the bearing capacity of the film cushion according to the invention by the foil layer.

10 For this purpose the level of the first and second pressure and/or the ratio between the first and second pressure are such that the foil layer relieves the outer foil layer, in particular in the case of outwardly directed suction, in that a portion of pressure of the outer foil layer is transferred via the pressurised fluid medium to the foil layer.

15 Thus it is no longer necessary to double the outer foil layer as in the prior art, as the reinforcing element supports the load transfer internally.

The building covering element according to the invention can be developed in that the foil layer consists at least partly of a material that can change form, in particular an elastic material. The transfer of pressure from the outer foil layer via the fluid medium to the foil layer is supported in that the reinforcing element is not
20 dimensionally stable, but can change form and is thus made from an elastic material. The same can also apply to the outer foil layer, which can then be made at least partly from a material which can change form, in particular an elastic material. The pressure transfer is further supported if the outer foil layer is also not dimensionally stable, but can adjust its form and for this purpose is also made from an elastic material.

25 Preferably, the foil layer is curved in the same direction as the outer foil layer, which is usually curved outwardly. In a preferred development of this design the curvatures of the foil layer and the outer foil layer should be similar to one another. This is an advantage for a particularly effective transfer of pressure.

30 According to the invention, the reinforcing element is configured as a further foil layer. This has the advantage that to simplify manufacturing for example the same material can be used for the two outer foil layers and the reinforcing element. For this purpose for example also the inner foil layer can be made from the same elastic material as the outer foil layer and/or the reinforcing element. The division of the film cushion

into two chambers by the middle foil layer also creates two-layered thermal insulation and thus an improvement in the insulation effect of the film cushion overall, in that in particular the second chamber contributes to the thermal insulation.

5 According to the invention the second chamber has a smaller volume than the first chamber.

The building covering element according to the invention can also be characterised in that the tension in the reinforcing element is over 100% of the tension in the outer foil layer. This tension ratio supports the transfer of pressure from the outer foil layer to the reinforcing element. In case of an intensive transfer of pressure the
10 tension in the reinforcing element can if necessary also be much more than 100% of the tension in the outer foil layer.

The construction of the film cushion according to the invention with the reinforcing element in the form of a further foil layer makes it possible to achieve the reinforcement in a technically new manner and at the same time reduce the use of
15 material and the associated manufacturing costs of the film cushion.

In the following a preferred embodiment is explained in more detail with reference to the accompanying drawing.

Figure 1 shows schematically a building covering element according to the invention in cross-section.

20 Figure 1 shows a building covering element 100 according to the invention, which with a plurality of other building covering elements according to the invention can form a foil roof or foil façade system.

The building covering element 100 according to the invention consists of an outer foil 101, an inner foil 102 and a reinforcing element 107. The reinforcing element
25 is configured to be essentially flat, i.e. it has a much greater extension in length and width than in height. Both the reinforcing element 107 and the outer foil 101 preferably consist of an elastic material which allows the reinforcing element 107 and/or the outer foil 101 to change form. Here the reinforcing element 107 can also be designed as a foil.

The outer foil 101, the inner foil 102 and the reinforcing element 107 are welded
30 to one another at their edges 103 and 104, so that a first essentially fluid-tight closed chamber 108 is formed between the reinforcing element 107 and the inner foil 102 and a second essentially fluid-tight closed chamber 109 is formed between the reinforcing element 107 and the outer foil 101. The fluid medium in the first chamber 108 is

pressurised by a first pressure. The fluid medium in the second chamber 109 is pressurised by a second pressure. Here the pressure on the fluid medium in the first chamber 108 is greater than the pressure on the fluid medium in the second chamber 109. The second chamber 109 also has a smaller volume than the first chamber 108.

5 To supply the building covering element 100 with a fluid medium, in particular air, a supply device (not shown) can be provided, which is preferably connected via pipe or hose lines to the two chambers 108, 109.

 On the basis of the aforementioned arrangement the outer foil 101 is curved outwardly, as shown in Figure 1. However, the inner foil 102 is curved in the opposite
10 direction, and in the direction of the inside of the building. As also shown in Figure 1 the reinforcing element 107, which is also made from a foil material, is curved in the same direction as the outer foil 101. In contrast to the representation of Figure 1 preferably the curvatures of the outer foil 101 and the reinforcing element 107 should be as similar as possible to one another.

15 At its edges 103 and 104 the building covering element 100 is secured by fastening elements 105 and 106, by means of which it is connected to further building covering elements and/or a support structure.

 If outwardly directed forces engage with the outer foil 101, for example wind suction forces, the latter are transferred via the pressurised fluid medium partly also to
20 the reinforcing element 107, so that the latter is involved in the pressure transfer and prevents the malfunction of the outer foil 101. As the reinforcing element 107 and the outer foil 101 are made from elastic material, both the reinforcing element 107 and the outer foil 101 can deform, in particular from the effect of pressure. This change of form supports the transfer of load from the outer foil 101 to the reinforcing element 107 via
25 the pressurised fluid medium.

 In the reinforcing element 107 the tension is over 100% of the tension in the outer foil 101. It can be recognised here that the reinforcing element has a significant proportion of the pressure transfer. The tension in the reinforcing element 107 can however, particularly when under pressure, also be much more than 100% of the
30 tension in the outer foil 101. This is the case when a large proportion of the pressure can be removed via the reinforcing element 107 and thus the malfunction of the outer foil 101 is prevented.

Furthermore, the two fluid-filled chambers 108 and 109 can contribute to the thermal insulation effect of the building covering element 100.

P A T E N T K R A V

1. Bygningsafskærmningselement (100) med en foliepude, som omfatter et ydre folielag (101) og et indre folielag (102), som danner indersiden af et bygningsdække, hvilke
 5 lag mellem sig danner mindst et i det væsentlige fluidtæt lukket hulrum, hvori et flydende medium, fortrinsvis luft, er indeholdt, og med et forstærkningselement, som er udformet som et mellemliggende folielag (107), som opdeler det i det væsentlige fluidtæt lukkede hulrum i et første i det væsentlige fluidtæt lukket kammer (108) mellem det indre folielag (102) og det mellemliggende folielag (107) og et andet i det væsentlige fluidtæt lukket
 10 kammer (109) mellem det ydre folielag (101) og det mellemliggende folielag (107), hvor det ydre folielag (101), det indre folielag (102) og det mellemliggende folielag (107) er svejset sammen med hinanden i kanterne (103, 104), og det flydende medium i det første kammer (108) er tryksat med et første tryk, og det flydende medium i det andet kammer (109) er tryksat med et andet tryk, k e n d e t e g n e t ved, at det andet kammer (109)
 15 har et mindre rumfang end det første kammer (108), spændingen i det mellemliggende folielag (107) andrager over 100 % af spændingen i det ydre folielag (101), og størrelsen af det første og det andet tryk og/eller forholdet mellem det første og det andet tryk er indstillet således, at det andet tryk er lavere end det første tryk, og det mellemliggende folielag (107) som forstærkningselement aflaster ved udadrettede sugevirkninger det ydre
 20 folielag (101), der danner ydersiden af et bygningsdække, idet en del af belastningen på det ydre folielag (101) via det tryksatte flydende medium overføres til det mellemliggende folielag (107).

2. Bygningsafskærmningselement (100) ifølge krav 1, k e n d e t e g n e t ved, at det mellemliggende folielag (107) i det mindst afsnitsvis består af et materiale, der tillader
 25 formændringer, fortrinsvis et elastisk materiale.

3. Bygningsafskærmningselement (100) ifølge mindst et af de forudgående krav, k e n d e t e g n e t ved, at det ydre folielag (101) i det mindst afsnitsvis består af et materiale, der tillader formændringer, fortrinsvis et elastisk materiale.

4. Bygningsafskærmningselement (100) ifølge mindst et af de forudgående krav, hos
 30 hvilket det ydre folielag (101) er udadkrummet, k e n d e t e g n e t ved, at det mellemliggende folielag (107) er krummet i den samme retning som det ydre folielag (101) er krummet.

5. Bygningsafskærmningselement (100) ifølge krav 4, k e n d e t e g n e t ved, at krumningen af det mellemliggende folielag (107) svarer til krumningen af det ydre folielag
 35 (101).

6. Anvendelse af et mellemliggende folielag (107) som forstærkningselement i et bygningsafskærmningselement (100) med en foliepude, som omfatter et ydre folielag (101) og et indre folielag (102), som danner indersiden af et bygningsdække, hvilke lag mellem sig danner mindst et i det væsentlige fluidtæt lukket hulrum, som indeholder et
 40 flydende medium, fortrinsvis luft, og af det mellemliggende folielag (107) er opdelt i et første, i det væsentlige fluidtæt lukket kammer (108) mellem det indre folielag (102) og

det mellemliggende folielag (107) og et andet i det væsentlige fluidtæt lukket kammer (109) mellem det ydre folielag (101) og det mellemliggende folielag (107), hvor det ydre folielag (101), det indre folielag (102) og det mellemliggende folielag (107) er svejset sammen med hinanden i kanterne (103, 104), og det flydende medium i det første kammer (108) er tryksat med et første tryk, og det flydende medium i det andet kammer (109) er tryksat med et andet tryk, k e n d e t e g n e t ved, at det andet kammer (109) har et mindre rumfang end det første kammer (108), spændingen i det mellemliggende folielag (107) andrager over 100 % af spændingen i det ydre folielag (101), og størrelsen af det første og det andet tryk og/eller forholdet mellem det første og det andet tryk er indstillet således, at det andet tryk er lavere end det første tryk, og det mellemliggende folielag (107) aflaster som forstærkningselement ved udadrettede sugevirkninger det ydre folielag (101), der danner ydersiden af et bygningsdække, idet en del af belastningen på det ydre folielag (101) via det tryksatte flydende medium overføres til det mellemliggende folielag (107).

Fig.1

