(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 359 629 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
11.06.2025 Bulletin 2025/24

(21) Application number: **22734635.0**

(22) Date of filing: **24.06.2022**

(51) International Patent Classification (IPC):
E06B 3/663 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E06B 3/66352

(86) International application number:
PCT/EP2022/067321

(87) International publication number:
WO 2022/269029 (29.12.2022 Gazette 2022/52)

(54) A SPACER PROFILE WITH SEALING ELEMENT

ABSTANDHALTERPROFIL MIT DICHTUNGSELEMENT

PROFIL D'ESPACEUR AVEC ÉLÉMENT D'ÉTANCHÉITÉ

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **25.06.2021 EP 21181666**

(43) Date of publication of application:
01.05.2024 Bulletin 2024/18

(73) Proprietor: **ROLLTECH A/S**
9800 Hjørring (DK)

(72) Inventor: **PEDERSEN, Peter**
9800 Hjørring (DK)

(74) Representative: **Chas. Hude A/S**
Langebrogade 3B
1411 Copenhagen K (DK)

(56) References cited:
DE-A1- 102011 011 549
DE-A1- 3 321 878
DE-U1- 202016 008 421
US-A- 5 512 341
US-A1- 2013 305 656

EP 4 359 629 B1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a spacer profile with improved sealing for mounting between glass panes for forming an intervening space between said glass panes.

DESCRIPTION OF PRIOR ART

[0002] It is well known to provide spacer profiles in order to define the spacing between the panes of insulating glazing consisting of a plurality of parallel glass panes spaced by an insulating cavity.

[0003] DE 20 2016 008421 U1, US 2013/305656 A1, DE 10 2011 011549 A1, DE 33 21 878 A1, US 5 512 341 A relate to spacers with a sealing element between the spacer and the panes.

[0004] Spacer profiles made of various materials and of various shapes are known in the art. Spacer profiles made by roll forming of a metal foil are widely used in the art and considered to be one of the preferred alternatives because of their stability and their low gas diffusion properties. Another type of widely used spacer profiles are hybrid spacer profiles having a profile body fully or partly made of a plastic material and provided with a foil made of materials such as metal, polymers or combinations thereof.

[0005] Insulating Glass Units (IG units) having a plurality of glass panes are made by automatic manufacturing machines. Spacer profiles are automatically bent to the desired size and shape and are arranged between two neighboring glass panes. Spacer profiles made of metal foils can be easily bent and will remain in the bent position.

[0006] Usually, a primary sealant is used between the sides of the spacer profile and the glass panes. Polyisobutylene (PIB) is the most common primary seal. The purpose of the primary seal is to make a gastight seal between the panes and the spacer. This is done to keep the gas inside the sealed space between the panes and the spacer and also to keep moisture out of the IG unit. The primary seal is usually supplemented with a secondary seal provided on the edge of the spacer and the glass panes so as to provide elastic structural bonding of the assembly. Solutions are seen, where the primary and the secondary sealant are the same component.

[0007] The primary sealant such as PIB has a limited adhesion property that can be used to hold the spacer in position during production, but the main purpose of the PIB is to maintain the gastight seal during stretching and compression as a result of pumping actions caused by sun and wind. However, when heated the PIB becomes less viscous and the pumping action of the panes causes the PIB to leak into the visible area of the IG unit. This phenomenon is known as creep. The problem with migration or creeping is increasing and it is expected that the global warming will add further to the problem.

[0008] Creep is not only an aesthetic problem. If it becomes too large, the IG unit must be changed, as there is a risk that the seal no longer is tight when the PIB is cooled during winter. If small pores are made when the butyl glue retracts then the gas between the panes can leak and/or humidity can enter the space between the panes.

[0009] The problem is of particular importance for bend profiles due to the traditional bending process. In the bending process mechanical support is applied to the sides of the spacer profile during the bending. Thereby it is secure that during the bending excess material does not enlarge the width of the spacer profile. This means that excess material is forced inwardly instead, and this can result is small cracks, pores or wrinkles on the outer side surface in the corners of the bend spacer profile. These, cracks, pores or wrinkles act as channels for the PIB during the pumping actions cause by sun and wind.

[0010] One attempt to solve this problem is to provide a groove in the spacer between the PIB and the interior of the IG unit. The groove functions as a reservoir, into which the PIB can expand when heated and from which it can retract when cooled. However, experience has shown that the reservoir becomes filled and thereafter the creep continues. Obvious solutions would be to increase the reservoir size and/or make additional reservoirs. Both solutions mean more complex profiles which increases production price and means increased risk of production errors. Thus, there is a need for a simpler solution that prevents the PIB from creeping into the visible area of the IG unit.

SUMMARY OF THE INVENTION

[0011] An object of the present invention is to solve the problem of PIB creep. More specifically, it is an object of the present invention to provide a spacer profile for mounting between glass panes for forming an intervening space between said glass panes, where the risk of PIB creep is significantly reduced. Further, it is an object of the present invention to provide an IG unit comprising at least two panes and a spacer profile, where the risk of PIB creep into the visible area of the IG unit is reduced. Finally, it is an object of the invention to provide a method for producing IG units comprising at least two panes and a spacer profile, where the resulting IG unit has a reduced risk of PIB creep into the visible area of the IG unit.

[0012] In general, the problem has been solved by adding a sealing element preferably positioned on or adjacent to the outer surface of the side walls of the spacer body of a spacer profile. With a sealing element is meant a construction which helps to prevent or limit the unintentional transition of a substance from one space to another. When the sealing element is used as described, it prevents or limits the PIB from creeping from the sealing position into the interior space of the IG unit.

[0013] According to the invention there is provided:

A spacer profile extending in a longitudinal direction Z and comprising a spacer body, said spacer body comprising:

- an inner wall having a first width, said inner wall being perpendicular to the longitudinal direction Z,
- an outer wall having a second width, said outer wall and said inner wall being separated by a first distance d1,
- two side walls having a height h, said two side walls being separated by a second distance d2,
- the inner wall, the outer wall and the two side walls together are forming a chamber suitable for containing a desiccant,
- optionally the spacer body further comprises two outer connection walls extending between said two side walls and said outer wall such that the inner wall, the outer wall, the two side walls and the outer connection walls together are forming the chamber suitable for containing a desiccant,
- optionally the spacer body further comprises two inner connection walls extending between said two side walls and said inner wall such that that the inner wall, the outer wall, the two side walls and the inner connection walls together are forming the chamber suitable for containing a desiccant,

wherein the spacer profile further comprises a sealing element, the sealing element is in form of an elongated appendix wherein:

- said elongated appendix is connected to the spacer body at a position being no more than 1/3 of the first distance d1 away from the inner wall
- said elongated appendix extends in a direction from the inner wall and outwardly and forming an angle α with an extension line of the side wall between 3 and 60 degrees
- said elongated appendix has a length L1 being no more than ½ of the height h of the side walls.

[0014] Preferably, the sealing element is positioned on and/or adjacent to an outer surface of the side walls or being or forming an overhang over the side walls.

[0015] The sealing element is in form of an elongated appendix, preferably of a synthetic material. The elongated appendix is connected to the spacer body at a position being no more than 1/3 of the first distance d1 away from the inner wall, preferably no more than 1/6 of the first distance d1 away from the inner wall. Preferably the elongated appendix is connected to the spacer body at the position of the inner wall.

[0016] The elongated appendix extends in a direction from the inner wall and outwardly and forming an angle α with an extension line of the side wall between 3 and 60 degrees, more preferably between 5 and 45 degrees and most preferred between 10 and 40 degrees.

[0017] Preferably the distance between an extension line of the side wall and a line parallel therewith and touching the end of the elongated appendix is between between 0.05 and 1 mm, preferably between 0.1 and 0.8 mm and more preferably between 0.2 and 0.6 mm. By having the elongated appendix extending further out than the sidewalls the primary sealant is prevented from entering the interior of an IGU.

[0018] The elongated appendix has a length L1 being no more than ½ of the height h of the side wall, preferably no more than 1/3 of the height h of the side walls and most preferred no more that ¼ of the height h of the side walls.

[0019] The advantages of this combination of the length L1 of the elongated appendix, the position at which it is attached to the spacer body and the angle are multiple:

Firstly, during bending the elongated appendix will be squeezed towards the side wall of the spacer body during bending, but is will reposition itself after the bending and thereby cover any cracks, pores or wrinkles formed during the bending. Thus, it will improved the sealing in the bend regions of the spacer body.

[0020] Secondly, it leaves room on the side walls for the primary sealant and forms a barrier between the primary sealant and the intervening space between the panes. Thereby butyl creep is prevented during the pumping actions caused by sun and wind.

[0021] Thirdly, the elongated appendix will always follow the panes and their movement during pumping actions and thereby a tight connection is kept.

[0022] Fourthly, a sharp uniform surface is visual from the outside, when looking into the IGU unit because no sealant is visible. Further, no metal, when used, will be visible as well. This is desired by customers

[0023] In a particular suited embodiment the elongated appendix is combined with a groove positioned behind the elongated appendix. Preferably the groove has a length L2 being larger than the length L1.

[0024] The advantage of the combination of the elongated appendix and the groove is that the groove will function as a reservoir capable of store the butyl that might migrate during the pumping actions cause by sun and wind.

[0025] It is to be noted that the primary sealant usually will be put on the side wall and not on the elongated appendix. Thus any migrating primary sealant will be stopped by the elongated appendix and forced into the groove thereby keeping the visible area of the IG unit free from primary sealant.

[0026] When the groove has a length L2 being larger than the length L1 of the elongated appendix the elongated appendix can flip into the groove during the bending operation and thereby provide further protection of the elongated appendix during bending. After the bending operation the elongated appendix returns to its original position.

[0027] Preferably the synthetic material of elongated appendix is same synthetic material that is used for the spacer body.

[0028] Preferably the synthetic material of the elongated appendix is selected from the group consisting of: polyolefins such as polyethylene, polypropylene and polyethylene terephthalate; polyamides, polyesters, ethylene-vinyl acetate, polycarbonates, ABS, SAN, PCABS. Co-polymers of the mentioned polymers can also be used

[0029] When referring to the inner or outer surface of the inner wall, the outer wall, the side walls, the outer connection walls or the inner connection walls, respectively, the inner surface is the surface towards the chamber and the outer surface is the surface opposite to the chamber.

[0030] The spacer body can be made of various materials such as metals, polymers and/or combinations thereof.

[0031] The spacer body can be in form of a folded metal sheet, in which case the spacer body is exclusively made of metal, such as aluminum and stainless steel. Upon such a spacer body, a sealing element can be attached by use of an adhesive.

[0032] Alternatively, the spacer body can be made of a polymeric material, where the sealing element can either be attached to or be an integral part of the spacer body. An integral part is to be understood as the sealing element being molded/extruded/co-extruded together with the spacer body so that it is a continuous part of the spacer body.

[0033] In another variant the spacer body is a hybrid materiel comprising both polymeric material, reinforcements made of metal and optionally diffusion barriers made of metal or polymeric foils.

[0034] In a preferred embodiment the spacer body is be made of a polymeric material, where the elongated appendix is either be attached to or be an integral part of the spacer body. An integral part is to be understood as the sealing element being molded/extruded/coextruded together with the spacer body so that it is a continuous part of the spacer body

[0035] In general, spacer profiles comprising spacer bodies made of thin walled stainless steel, plastic or hybrid materials are known as warm edge profiles. The invention is suitable for all types of warm edge profiles.

[0036] In preferred embodiments, the inner wall comprises opening so that there can be communication between the chamber and the intervening space of the IG unit. Thereby, the desiccant can remove any moisture entering the intervening space.

[0037] In variants, the chamber defined by the inner wall, the outer wall, the side walls and optionally inner connection walls and/or outer connection walls can be further divided into smaller chambers. This can be done by applying separation walls in the chamber. The separation walls have the advantage that they can support the structure of the spacer body and/or during use of multiple desiccants and keep them separated.

[0038] In one embodiment, the sealing element is in form of an adhesive polymer. In a preferred embodiment, the sealing member in form of an adhesive polymer has an elongated shape with a rectangular, trapezoid or parallelogrammical cross section. It is particularly preferred that the adhesive polymer is positioned on the outer surface of the side walls of the spacer body but in a way leaving part of the outer surface of the side walls free so that the primary sealant can be applied there. In a preferred version, the adhesive polymer is positioned on the outer surface of the side walls in such a way that at least 1/6 of the surface is free, preferably more that 1/3 of the of the surface is free, even more preferred ½ of the surface is free, particularly it is preferred that ¾ of the surface is free and especially preferred 5/6 of the surface is free. This leaves room for the primary sealant to be positioned on the outer surface of the side walls and below the sealing element made of an adhesive polymer.

[0039] In an alternative embodiment, the sealing element in form of an adhesive polymer is in form of a shoulder joining the inner wall of the spacer body of the spacer profile. The shoulder extends from the inner wall and at least down to 1/3 of the height of the side walls, preferably at least down to 1/6 of the height of the side walls.

[0040] The sealing element in form of an adhesive polymer can be used on both a space profile made of folded metal, on spacer profiles made of a polymeric material and on hybrid spacer profiles made of a combination of a polymeric material and metals.

[0041] Particularly suited adhesive polymers are made of polyamides, polyesters, ethylene-vinyl acetate, polyurethanes, and a variety of block copolymers and elastomers such as butyl rubber, ethylene-propylene copolymer, styrene-butadiene rubber and EDPM rubbers.

[0042] In another embodiment, the sealing element is in form of an elongated body with a rectangular, trapezoid or parallelogrammical cross section made of a first polymeric material. At least one of the sides of said elongated body is provided with an adhesive.

[0043] Preferred polymers for the first polymeric material are polymeric foams, natural rubbers, synthetic rubbers and EDPM rubbers. Suitable polymeric foams are foams such as a polyurethane foam or a polyisocyanurate foam.

[0044] Preferred adhesives are epoxies, polyurethanes, polyimides.

[0045] According to the invention, there is further provided an IG unit comprising at least two panes arranged opposite to each other and spaced apart with a spacer frame thereby forming an intervening space therebetween, said spacer frame is made from a spacer profile comprising a spacer body, said spacer body comprising:

- an inner wall having a first width, said inner wall being perpendicular to the longitudinal direction Z,
- an outer wall having a second width, said outer wall and said inner wall being separated by a first distance d1,
- two side walls having a height h, said two side walls

being separated by a second distance d2,

- the inner wall, the outer wall and the two side walls together are forming a chamber suitable for containing a desiccant,
- optionally the spacer body further comprises two outer connection walls extending between said two side walls and said outer wall such that the inner wall, the outer wall, the two side walls and the outer connection walls together are forming the chamber suitable for containing a desiccant,
- optionally the spacer body further comprises two inner connection walls extending between said two side walls and said inner wall such that that the inner wall, the outer wall, the two side walls and the inner connection walls together are forming the chamber suitable for containing a desiccant,
- a primary sealant,

wherein the IG unit further comprises a sealing element sealing element is in form of an elongated appendix wherein:

- said elongated appendix is connected to the spacer body at a position being no more than 1/3 of the first distance d1 away from the inner wall
- said elongated appendix extends in a direction from the inner wall and outwardly and forming an angle α with an extension line of the side wall between 3 and 60 degrees
- said elongated appendix has a length L1 being no more than ½ of the height h of the side walls.

[0046] In a preferred embodiment, the sealing element in the IG unit is in form of an adhesive polymer. In a preferred embodiment, the sealing member in form of an adhesive polymer has an elongated shape with a rectangular, trapezoid or parallelogrammical cross section.

[0047] It is particularly preferred that the adhesive polymer is positioned on the outer surface of the side walls of the spacer but in a way leaving part of the outer surface of the side walls free so that the primary sealant can be applied there. In a preferred version the adhesive polymer is positioned on the outer surface of the side walls in such a way that at least 1/6 of the surface is free, preferably more than 1/3 of the of the surface is free, even more preferred ½ of the surface is free, particularly it is preferred that ¾ of the surface is free and especially preferred 5/6 of the surface is free. This leaves room for the primary sealant to be positioned on the outer surface of the side walls and below the sealing element made of an adhesive polymer.

[0048] In another embodiment of the IG unit, the sealing element is in form of an elongated body with a rectangular, trapezoid or parallelogrammical cross section made of a first polymeric material. At least one of the sides of said elongated body is provided with an adhesive. Suitable materials for the first polymeric material are polymeric foams, natural rubbers, synthetic rubbers and EDPM rubbers. Suitable polymeric foams are foams such as a polyurethane foam or a polyisocyanurate foam.

[0049] According to the invention, there is further provided a method for producing IG units comprising the steps of:

- Providing at least two panes
- Bending a spacer profile into a spacer frame, wherein the spacer proflie comprises a spacer body, said spacer body comprising:
    - ◦ an inner wall having a first width, said inner wall being perpendicular to the longitudinal direction Z,
    - ◦ an outer wall having a second width, said outer wall and said inner wall being separated by a first distance,
    - ◦ two side walls having a height h, said two side walls being separated by a second distance,
    - ◦ the inner wall, the outer wall and the two side walls together are forming a chamber suitable for containing a desiccant,
    - ◦ optionally the spacer body further comprises two outer connection walls extending between said two side walls and said outer wall such that the inner wall, the outer wall, the two side walls and the outer connection walls together are forming the chamber suitable for containing a desiccant,
- sealing the at least two panes to the spacer frame by means of a primary sealant,
- optionally fixing and/or further sealing with a secondary sealant,
- wherein a sealing element in form of an elongated appendix is attached to the at least two panes, to the spacer profile or to the spacer frame in such a manner that the sealing element is positioned between the primary sealant and an intervening space formed by the spacer frame and the at least two panes,the sealing element is in form of an elongated appendix wherein:
    - said elongated appendix is connected to the spacer body at a position being no more than 1/3 of the first distance d1 away from the inner wall
    - said elongated appendix extends in a direction from the inner wall and outwardly and forming an angle α with an extension line of the side wall between 3 and 60 degrees
    - said elongated appendix has a length L1 being no more than ½ of the height h of the side walls.

[0050] Preferably, the sealing element is attached to the at least two panes, to the spacer profile or to the spacer frame prior to the primary sealant. The advantage of attaching the sealing element prior to applying the

primary sealant is that it decreases the risk of the primary sealant entering the intervening space i.e. the visible area of the IG unit.

[0051] The invention further relates to a particularly suited spacer profile.

[0052] The particularly suited spacer profile is extending in a longitudinal direction Z and comprising a spacer body, said spacer body comprising:

- an inner wall having a first width, said inner wall being perpendicular to the longitudinal direction Z,
- an outer wall having a second width, said outer wall and said inner wall being separated by a first distance d1,
- two side walls having a height h, said two side walls being separated by a second distance d2,
- two outer connection walls extending between said two side walls and said outer wall, where the inner wall, the outer wall, the two side walls and the two connection walls together are forming a chamber suitable for containing a desiccant, the spacer body further comprises a sealing element in form of an elongated appendix.

[0053] The particularly suited spacer profile may further comprise a diffusion barrier, where the diffusion barrier can be a barrier made of metal or a barrier made of a polymeric material. The diffusion barrier can be a single sheet, or it can be of multiple overlapping sheets. Suitable polymeric diffusion barriers are made of materials such as ethylene-vinyl-alcohol copolymers (EVOH).

[0054] Another suitable polymer-based diffusion barrier is made of polyethylene (PE) or polyethylene terephthalate (PET) preferably sputtered with a SiO_x material where $0 \leq X \leq 2$.

[0055] In a preferred version, at least part of the profile body is made of a polymeric material. Preferably, the polymeric material is a poor heat conduction. Suited polymeric materials can be selected from the group consisting of Polyolefins such as polypropylene or polyethylene terephthalate, polyamides, polycarbonates, ABS, SAN, PCABS. Co-polymers of the mentioned polymers can also be used.

[0056] In a preferred embodiment, the elongated appendix is made of a polymer selected from the group consisting of polyamides, polyesters, ethylene-vinyl acetate, polyurethanes. Alternatively, the elongated appendix can be made of a variety of block copolymers and elastomers such as butyl rubber, ethylene-propylene copolymer, styrene-butadiene rubber and EDPM rubbers. Particularly preferred are EDPM rubbers and polyamides.

[0057] In a preferred embodiment, the elongated appendix forms an overhang over the side walls.

[0058] Preferably, the profile body further comprises a groove in the side walls. The groove being positioned so that at least a part of the elongated appendix fits into the groove. The elongated appendix can then be partly pushed into the groove, when pressure is applied on the outer side. Thereby, a tight but flexible sealing is obtained, and the risk of the primary sealant, usually in form of PIB, creeping into the visible part of the IG unit is minimized.

[0059] Preferably, the elongated appendix is bendable so that it will bend towards the side walls, when light to moderate pressure is applied on the outside. With light to moderate pressure is understood the forces usually applied when mounting the spacer profile in an IG unit.

[0060] In a variant of the particularly suited spacer profile, the profile body is at least partly made of a polymeric material of the above kind, and the spacer profile comprises a diffusion barrier of metal being firmly bonded with the profile body. The diffusion barrier comprises at least four (4) bendings, where the first bending is a bending of at least 80°, preferably at least 90°. This combination provides a spacer profile that has suitable stiffness while still having very few wrinkles when bent into a frame during production of IG units. The diffusion barrier can also comprise a bending of 180° thereby forming two substantially parallel overlapping layers. This gives an increased stiffness and especially when combined with a first bending of at least 90°.

[0061] In a particularly suited variant the groove behind the elongated appendix is formed by the diffusion barrier.

LIST OF FIGURES

[0062]

Fig. 1 is a schematic illustration of a spacer profile.

Figs. 2a-d are illustrations of the spacer profiles with various cross sections.

Figs. 3a-b illustrate spacer profiles with a sealing element.

Figs. 4a-b illustrate spacer profiles with a variant of the sealing element.

Fig. 5 illustrates a spacer profile with a sealing flange.

Fig. 6 illustrates a spacer profile with a sealing element in form of an elongated appendix.

Fig. 7 illustrates an IG unit with a sealing element.

Fig. 8 illustrates an IG unit comprising a spacer profile with a sealing element in form of an elongated appendix.

Fig. 9 illustrates a spacer profile with a sealing element in form of an elongated appendix

Fig. 10 illustrates a spacer profile with a sealing element in form of an elongated appendix and a

groove formed by the diffusion barrier

DESCRIPTION OF DRAWINGS

[0063] Only the embodiments shown in figures 6, 8-10 form part of the present invention. In figure 1, a spacer profile 1 is illustrated. The spacer profile 1 comprises a profile body 10, where the profile body comprises an inner wall 11 and an outer wall 12 being separated from the inner wall 11 by a first distance d1. When mounted between the panes in an IG unit, the inner wall is facing towards the interior of the IG unit, i.e. the intervening space formed between the panes and the spacer. The profile body in figure 1 further comprises two side walls 13, 14. The side walls 13, 14 can be parallel to each other or they can be slightly slanted. The angle θ between the side walls 13, 14 and the inner wall 11 can be between 60° and 120°, preferably between 60° and 105°, or even more preferably between 75° and 105°. The two side walls 13, 14 are separated by a second distance d2, and they have a height h. In figure 1, the inner wall and the outer wall are illustrated as being parallel, but that does not have to be the case. Solutions exist, where the inner wall and the outer wall are separated by a first distance d1, and where they are slanted, curved etc. relative to each other. The inner wall 11, the outer wall 12 and the two side walls 13, 14 define a chamber 50, the chamber being suitable for containing a desiccant.

[0064] Figure 2 a-d illustrate a cross section of four different spacer profiles. In figure 2a, the spacer comprises a profile body 10 which comprises an inner wall 11 and an outer wall 12 being separated from the inner wall 11 by a first distance d1. The profile body 10 further comprises two sidewalls 13, 14 of a height h. Their orientation relative to the inner wall can be as described for figure 1. The two side walls 13, 14 are separated by a second distance d2. Together the inner wall 11, the outer wall 12 and the two side walls 13, 14 define a chamber 50 suitable for containing a desiccant. The side walls 13, 14 have an inner surface 31 and an outer surface 32, where the inner surface is the surface towards the chamber 50, and the outer surface 32 is the opposite side. Usually, the outer surface 32 is the place where a primary sealant such as PIB is applied, when the spacer profile is mounted in an IG unit.

[0065] The spacer profile in figure 2b differs from the spacer profile in figure 2a in that the spacer body 10 further comprises two outer connection walls 15, 16. The outer connection walls 15, 16 connect the sidewalls 13, 14 with the outer wall 12. Together the inner wall 11, the outer wall 12, the two side walls 13, 14 and the two outer connection walls 15, 16 define a chamber 50 suitable for containing a desiccant. The outer connection walls can be straight as illustrated, but other shapes such as curved, concave, convex etc. can also be useable. As can be seen from figure 2b, the height h of the side walls are decreased, when the outer connection walls 13, 14 are present compared to the height of a the side walls, when the profile body does not comprise outer connection wall as illustrated in figure 2a.

[0066] The spacer in figure 2c differs from the spacer in figure 2a in that the spacer body 10 further comprises two inner connection walls 17, 18. The inner connection walls 17, 18 connect the sidewalls 13, 14 with the inner wall 11. Together the inner wall 11, the outer wall 12, the two side walls 13, 14 and the two inner connection walls 17, 18 define a chamber 50 suitable for containing a desiccant. The advantage of the inner connection walls is that they provide a surface upon which a sealing element can be attached. Thus, a sealing element can be secured by both a part of the outer surface 32 of the connection walls and at least a part of the inner connection walls. The inner connection walls 17, 18 can be straight, curved, have a roughened outer surface, be corrugated or the like in order to improve the fixation properties. The fixation to the inner connection walls 17, 18 is illustrated in figures 4a and 4b.

[0067] The spacer in figure 2d differs from the spacer in figure 2a in that the spacer body 10 further comprises two outer connection walls 15, 16 and two inner connection walls 17, 18. The outer connection walls 15, 16 connect the side walls 13, 14 with the outer wall 12. The inner connection walls 17, 18 connect the side walls 13, 14 with the inner wall 11. Together the inner wall 11, the outer wall 12, the two side walls 13, 14, the two inner connection walls 17, 18 and the two outer connection walls 15, 16 define a chamber 50 suitable for containing a desiccant. The side walls 13, 14 have a height h.

[0068] Figures 3a-b illustrate the spacer from figure 2b with sealing elements 100. As is evident from figures 3a and 3b, the sealing elements could be attached to any one of the spacer profiles in figures 2a-d, and the sealing element could also be utilized together with other design variant of spacer profiles. Figure 3a illustrates a spacer profile 1 comprising a spacer body 10. The spacer body 10 comprises an inner wall 11 and an outer wall 12 being separated by a first distance d1. The profile body 10 further comprises two side walls 13, 14. The side walls 13, 14 can be parallel to each other, or they can be slightly slanted. The angle θ between the side walls 13, 14 and the inner wall 11 can be between 60° and 120°, preferably between 60° and 105°, or even more preferably between 75° and 105°. The two side walls 13, 14 are separated by a second distance d2, and they have a height h. The profile body 10 further comprises two outer connection walls 15, 16. The outer connection walls 15, 16 connect the sidewalls 13, 14 with the outer wall 12. Together the inner wall 11, the outer wall 12, the two side walls 13, 14 and the two outer connection walls 15, 16 define a chamber 50 suitable for containing a desiccant. The spacer profile 1 further comprises two sealing elements 100 attached to the sidewalls 13, 14 of the profile body 10. In the embodiment in figure 3a, the sealing elements 100 covers 1/3 of the height h of the outer surface 32 of the side walls. The sealing element 100 can be made of a single polymer, or it can be a composite material. Further,

the sealing elements 100 can have inherent adhesive properties, or an adhesive can be applied to the surface being connected to the side walls 13, 14. When the spacer profile 1 is positioned in an IG unit, the primary sealant, typically PIB, is positioned on the outer surface 32 of the sidewalls 13, 14 and on the part of the outer surface of the sidewall 101 extending from the sealing element and towards the outer connection elements 15, 16. The primary sealant typically will extend onto the surface of the outer connection elements, where the primary sealant meets with a secondary sealant. In case on a primary sealing being used, it typically covers the outer surface of the outer wall. Figure 3b is a variant of figure 3a, where the sealing elements 100 covers ½ of the height h of the outer surface 32 of the side walls.

[0069] Figures 4a-b illustrate embodiments, where the sealing elements 100 are fixed at least to a part of the outer surface of the inner connection elements 15,16. Figure 4a illustrates a spacer profile 1 comprising a profile body 10, where the profile body 10 comprises an inner wall 11 and an outer wall 12 being separated by a first distance d1. The side walls 13, 14 can be parallel to each other or they can be slightly slanted. The angle θ between the side walls 13, 14 and the inner wall 11 can be between 60° and 120°, preferably between 60° and 105°, or even more preferably between 75° and 105°. The two side walls 13, 14 are separated by a second distance d2, and they have a height h. The two side walls 13, 14 are separated by a second distance, and they have a height h. The spacer body 10 further comprises two outer connection walls 15, 16 and two inner connection walls 17,18. The outer connection walls 15, 16 connect the side walls 13, 14 with the outer wall 12. The inner connection walls 17, 18 connect the side walls 13, 14 with the inner wall 11. In the embodiment illustrated in figure 4a, the spacer profile further comprises two sealing elements 100, where the sealing element 100 is attached to at least a part of the outer surface of the inner connection walls 17,18 and being adjacent to the outer surface 32 of the side walls 13, 14. The advantage of using inner connection wall 17,18 for fixing the sealing element is that a long fixation surface can be obtained while maintaining the same height of the spacer and leaving more space on the outside of the side walls 13,14 for the primary sealant. Thereby, a better sealing can be obtained while still having sealing element 100 for keeping the primary sealant out of the interior of an IG unit. In the embodiment in figure 4a, the sealing element 100 roughly extends along the inner connection walls 17, 18 and to the point where the sidewalls 13,14 begin. This leaves alle the outer surface of the side wall 13,14 free for the primary sealant. The primary sealant can then be applied to the free area 101 of the outer surface 32 of the side walls 13, 14.

[0070] The embodiment in figure 4b differs from the embodiment in figure 4a in that the sealing element extends 1/2 way down of the height h of the outer side 32 of the side walls 13, 14. In this way, the sealing element 100 forms a shoulder like structure on the outside of the profile body 10. The advantage of extending the sealing element down on the outer surface 32 of the side walls 13, 14 is that the sealing effect is increased so as to better keep the primary sealant out of the intervening spacer of the IG unit. The embodiment in figure 4b illustrates that the sealing element extends 1/2 of the height of the side walls. However other solutions such as 1/6, 1/3 or ¾ are contemplated.

[0071] Figure 5 illustrates an embodiment, where the sealing element 100 is an integral part of the profile body 10. The spacer profile 1 illustrated in figure 5 comprises a profile body 10, where the profile body comprises an inner wall 11 being perpendicular to the longitudinal direction Z and an outer wall 12 being separated from the inner wall 11 by a first distance d1. The profile body 10 further comprises two side walls 13, 14. As described earlier, the side walls 13, 14 can be parallel to each other or they can be slightly slanted. When slanted, the angle θ between the side walls 13, 14 and the inner wall 11 can be between 60° and 120°, preferably between 60° and 105°, or even more preferably between 75° and 105°. The two side walls 13, 14 are separated by a second distance d2, and they have a height h

[0072] The profile body further comprises two outer connection walls 15, 16. The outer connection walls 15, 16 connect the sidewalls 13, 14 with the outer wall 12. Together the inner wall 11, the outer wall 12, the two side walls 13, 14 and the two outer connection walls 15, 16 define a chamber 50 suitable for containing a desiccant. The profile body 10 further comprises a sealing element 100, here in form of a sealing flange 102. In a suitable embodiment, the profile body is at least partly made of a first polymeric material, and the sealing flange can be of the same polymeric material, or in variants it can be of a second polymeric material. The spacer profile 1 may further comprise a diffusion barrier 60 firmly bonded with the profile body. The diffusion barrier 60 can be of a metal material, or it can be a polymeric material. In case of a polymeric material the barrier can be sputtered with SiO_x where X can be any number from and including 0 up to and including 2. The spacer profile 1 can further comprise reinforcement elements such as a wire in the profile body, or the barrier material is bended so as to increase stiffness. A preferred solution is to use a diffusion barrier 60 made of a metal such as aluminium or stainless steel. Such a barrier can be bended so as to increase the stiffness of the spacer profile 1. A preferred bending pattern comprises at least four (4) bendings, where the first bending 61 is a bending of at least 80°, preferably at least 90°. Another preferred bending pattern comprises a 180° bend as the last bending 62 thereby forming two substantially parallel overlapping layers. An even more preferred bending pattern comprises a first bending 61 of at least 90° and a last bending 62 of 180° thereby forming two substantially parallel overlapping layers. The overlapping layers are not shown in the figure. The sealing flange 102 is illustrated as being positioned in level with

the inner wall 11. However, other positions and extensions are possible. The sealing flange can be positioned in the first ½ of the height h of the side walls 13,14 measured from the inner wall 11. More preferred is a position within the first 1/3 of the height h measured from the inner wall 11. Preferably, the position and the width of the sealing flange leaves at least 1/6 of the outer surface 32 free, preferably more than 1/3 of the of the outer surface 32 is free, even more preferred is ½ of the outer surface 32 free, particularly it is preferred that ¾ of the outer surface 32 is free and especially preferred 5/6 of the outer surface 32 is free. The free area 101 of the outer surface can be used for sealing with the primary sealant when mounting the panes in the IG unit.

[0073] Figure 6 illustrates a variant of the spacer in figure 5. The spacer profile in figure 6 comprises a profile body 10, where the profile body comprises an inner wall 11 being perpendicular to the longitudinal direction Z and an outer wall 12 being separated from the inner wall 11 by a first distance d1. The profile body 10 further comprises two side walls 13, 14. As described earlier, the side walls 13, 14 can be parallel to each other or they can be slightly slanted. When slanted, the angle θ between the side walls 13, 14 and the inner wall 11 can be between 60° and 120°, preferably between 60° and 105°, or even more preferably between 75° and 105°. The two side walls 13, 14 are separated by a second distance d2, and they have a height h. The profile body further comprises two outer connection walls 15, 16. The outer connection walls 15, 16 connect the sidewalls 13, 14 with the outer wall 12. Together the inner wall 11, the outer wall 12, the two side walls 13, 14 and the two outer connection walls 15, 16 define a chamber 50 suitable for containing a desiccant. The profile body 10 further comprises a sealing element 100, here in form of an elongated appendix 103 extending from the profile body. In a preferred embodiment, the spacer profile 1 further comprises a groove 104 into which at least a part of the elongated appendix can fit. The profile body 10 is at least partly made of a first polymeric material and the elongated appendix can be of the same polymeric material, or in variants the elongated appendix can be of a second polymeric material. The spacer profile 1 further comprises a diffusion barrier 60 firmly bonded with the profile body. The diffusion barrier 60 can be of a metal material, or it can be a polymeric material. In case of a polymeric material, the barrier can be sputtered with SiO_x where X can be any number from and including 0 up to and including 2. The spacer profile 1 can further comprise reinforcement elements such as a wire in the profile body, or the barrier material is bended so as to increase stiffness. A preferred solution is to use a diffusion barrier 60 made of a metal such as aluminium or stainless steel. Such a barrier can be bended so as to increase the stiffness of the spacer profile 1. A preferred bending pattern comprises at least four (4) bendings, where the first bending 61 is a bending of at least 80°, preferably at least 90°. Another preferred bending pattern comprises a 180° bend as the last bending 62 thereby forming two substantially parallel overlapping layers. An even more preferred bending pattern comprises a first bending 61 of at least 90° and a last bending 62 of 180° thereby forming two substantially parallel overlapping layers. The overlapping layers are not shown in the figure.

[0074] Figure 7 illustrates an IG unit 2 comprising a spacer profile 1 and two panes 4, 5 arranged with the spacer between them so as to keep a distance between the panes 4, 5 and thereby defining an intervening space 3. The spacer profile 1 comprises a profile body 10 comprising an inner wall 11 and an outer wall 12 being separated from the inner wall 11 by a first distance d1. The inner wall 10 is facing towards the intervening space 3 of the IG unit 2. The profile body 10 further comprises two side walls 13, 14. The side walls 13, 14 can be parallel to each other or they can be slightly slanted. The angle θ between the side walls 13, 14 and the inner wall 11 can be between 60° and 120°, preferably between 60° and 105° or even more preferably between 75° and 105°. The two side walls 13, 14 are separated by a second distance d2, and they have a height h. The profile body 10 further comprises two outer connection walls 15, 16. The outer connection walls 15, 16 connect the sidewalls 13, 14 with the outer wall 12. Together the inner wall 11, the outer wall 12, the two side walls 13, 14 and the two outer connection walls 15, 16 define a chamber 50 suitable for containing a desiccant. The IG unit 2 further comprises two sealing elements 100 attached to the sidewalls 13, 14 of the profile body 10 and/or to the panes 4,5. In the embodiment in figure 7, the sealing elements 100 covers 1/3 of the height h of the outer surface 32 of the side walls. The sealing element 100 can be made of a single polymer, or it can be a composite material. Further, the sealing elements 100 can have inherent adhesive properties, or an adhesive can be applied to the surface being connected to the side walls 13, 14. The IG unit further comprises a primary sealant 6 located on the outer surface 32 of the side walls and on the opposite side of the sealing member than the intervening space 3 of the IG unit. The IG unit 2 further comprises an optional secondary sealant 7.

[0075] Figure 8 illustrates an IG unit 2 comprising a spacer profile 1 as described in figure 6 and two panes 4,5 arranged with a spacer profile between them so as to keep a distance between the panes 4,5 and thereby defining an intervening space 3. The IG unit further comprises a primary sealant 6 located on the outer surface 32 of the side walls and on the opposite side of the sealing member than the intervening space 3 of the IG unit. The IG unit 2 further comprises an optional secondary sealant 7. When the panes 5,6 are being fixed in the IG unit 2, the elongated appendix 103 will bend towards the profile body and thereby forming a tight seal keeping the primary sealant 6 out the of intervening space 3.

[0076] Figure 9 illustrates an embodiment, where the sealing element 100 is an integral part of the profile body 10 an is in form of an elongated appendix 103 having a length L. The spacer profile 1 illustrated in figure 5 com-

prises a profile body 10, where the profile body comprises an inner wall 11 being perpendicular to the longitudinal direction Z and an outer wall 12 being separated from the inner wall 11 by a first distance d1. The profile body 10 further comprises two side walls 13, 14. As described earlier, the side walls 13, 14 can be parallel to each other or they can be slightly slanted. When slanted, the angle θ between the side walls 13, 14 and the inner wall 11 can be between 60° and 120°, preferably between 60° and 105°, or even more preferably between 75° and 105°. The two side walls 13, 14 are separated by a second distance d2, and they have a height h

[0077] The profile body further comprises two outer connection walls 15, 16. The outer connection walls 15, 16 connect the sidewalls 13, 14 with the outer wall 12. Together the inner wall 11, the outer wall 12, the two side walls 13, 14 and the two outer connection walls 15, 16 define a chamber 50 suitable for containing a desiccant. The profile body 10 further comprises a sealing element 100, here in form of an elongated appendix 103. In a suitable embodiment, the profile body is at least partly made of a first polymeric material, and the sealing flange can be of the same polymeric material, or in variants it can be of a second polymeric material. The spacer profile 1 may further comprise a diffusion barrier 60 firmly bonded with the profile body. The diffusion barrier 60 can be of a metal material, or it can be a polymeric material. In case of a polymeric material the barrier can be sputtered with SiO_x where X can be any number from and including 0 up to and including 2. The spacer profile 1 can further comprise reinforcement elements such as a wire in the profile body, or the barrier material is bended so as to increase stiffness. A preferred solution is to use a diffusion barrier 60 made of a metal such as aluminium or stainless steel. Such a barrier can be bended so as to increase the stiffness of the spacer profile 1. A preferred bending pattern comprises at least four (4) bendings, where the first bending 61 is a bending of at least 80°, preferably at least 90°. Another preferred bending pattern comprises a 180° bend as the last bending 62 thereby forming two substantially parallel overlapping layers. An even more preferred bending pattern comprises a first bending 61 of at least 90° and a last bending 62 of 180° thereby forming two substantially parallel overlapping layers. The overlapping layers are not shown in the figure. Elongated appendix 103 is illustrated as being positioned in level with the inner wall 11. However, other positions and extensions are possible. The elongated appendix 103 forms an angle α with the extension line 110 of the sidewalls 13, 14 between 2 and 80 degrees, preferably between 3 and 60 degrees, more preferably between 5 and 45 degrees and most preferred between 10 and 40 degrees.

[0078] The length L of the elongated appendix is no more than ½ of the height h of the side wall, preferably no more than 1/3 of the height h of the side walls and most preferred no more that ¼ of the height h of the side walls. Thereby, the position and the length of the elongated appendix 103 leaves at least 1/6 of the outer surface 32 free, preferably more than 1/3 of the of the outer surface 32 is free, even more preferred is ½ of the outer surface 32 free, particularly it is preferred that ¾ of the outer surface 32 is free and especially preferred 5/6 of the outer surface 32 is free. The free area 101 of the outer surface can be used for sealing with the primary sealant when mounting the panes in the IG unit and the elongated appendix prevents it from creeping into the interior of the IGU.

[0079] Figure 10 illustrates spacer profile which comprises a profile body 10, where the profile body comprises an inner wall 11 being perpendicular to the longitudinal direction Z and an outer wall 12 being separated from the inner wall 11 by a first distance d1. The profile body 10 further comprises two side walls 13, 14. As described earlier, the side walls 13, 14 can be parallel to each other or they can be slightly slanted. When slanted, the angle θ between the side walls 13, 14 and the inner wall 11 can be between 60° and 120°, preferably between 60° and 105°, or even more preferably between 75° and 105°. The two side walls 13, 14 are separated by a second distance d2, and they have a height h. The profile body further comprises two outer connection walls 15, 16. The outer connection walls 15, 16 connect the sidewalls 13, 14 with the outer wall 12. Together the inner wall 11, the outer wall 12, the two side walls 13, 14 and the two outer connection walls 15, 16 define a chamber 50 suitable for containing a desiccant. The profile body 10 further comprises a sealing element 100, here in form of an elongated appendix 103 extending from the profile body. The elongated appendix 103 forms an angle α with the extension line 110 of the sidewalls 13, 14 between 2 and 80 degrees, preferably between 3 and 60 degrees, more preferably between 5 and 45 degrees and most preferred between 10 and 40 degrees.

[0080] The length L of the elongated appendix is no more than ½ of the height h of the side wall, preferably no more than 1/3 of the height h of the side walls and most preferred no more that ¼ of the height h of the side walls. Thereby, the position and the length of the elongated appendix 103 leaves at least 1/6 of the outer surface 32 free, preferably more than 1/3 of the of the outer surface 32 is free, even more preferred is ½ of the outer surface 32 free, particularly it is preferred that ¾ of the outer surface 32 is free and especially preferred 5/6 of the outer surface 32 is free

[0081] The profile body 10 is at least partly made of a first polymeric material and the elongated appendix can be of the same polymeric material, or in variants the elongated appendix can be of a second polymeric material. The spacer profile 1 further comprises a diffusion barrier 60 firmly bonded with the profile body. The diffusion barrier 60 can be of a metal material, or it can be a polymeric material. In case of a polymeric material, the barrier can be sputtered with SiO_x where X can be any number from and including 0 up to and including 2. The spacer profile 1 can further comprise reinforcement ele-

ments such as a wire in the profile body, or the barrier material is bended so as to increase stiffness. A preferred solution is to use a diffusion barrier 60 made of a metal such as aluminium or stainless steel. Such a barrier can be bended so as to increase the stiffness of the spacer profile 1. A preferred bending pattern comprises at least four (4) bendings, where the first bending 61 is a bending of at least 80°, preferably at least 90°. Another preferred bending pattern comprises a 180° bend as the last bending 62 thereby forming two substantially parallel overlapping layers. An even more preferred bending pattern comprises a first bending 61 of at least 90° and a last bending 62 of 180° thereby forming two substantially parallel overlapping layers. The overlapping layers are not shown in the figure.

[0082] In the embodiment illustrated in figure 10 the spacer profile 1 further comprises a groove 104 with a length L2 into which the elongated appendix can fit. The groove 104 is formed by the diffusion barrier 60. Alternatively the groove 104 can be formed in the sidewall itself.

[0083] In the embodiment illustrated in figure 10 the extension line of the sidewalls 110 and a line being parallel therewith and touching the end of the elongated appendix is separated by a third distance d3. The third distance can be between 0.05 and 1 mm, preferably between 0.1 and 0.8 mm and more preferably between 0.2 and 0.6 mm.

REFERENCES

[0084]

1 - Spacer profile
2 - IG unit
3 - intervening space
4, 5 - panes
6 - primary sealant
7 - secondary sealant
10 - profile body
11 - inner wall
12 - outer wall
13,14 - side walls
15,16 - outer connection walls
17,18 - inner connection walls
31 - inner surface
32 - outer surface
50 - chamber
60 - diffusion barrier
61 - first bending
62 - last bending
100 - sealing element
101 - area of outer surface
102 - sealing flange
103 - elongated appendix
104 - groove
110 - extension line of side walls
111 - a line parallel with the extension line of the side walls and touching the end of the elongated appendix
d1 - first distance
d2 - second distance
d3 - third distance
L1 - length of elongated appendix
L2 - length of groove
α - angle between elongated appendix and the extension line of side walls
h - height
θ - angle

Claims

1. A spacer profile (1) extending in a longitudinal direction Z and comprising a spacer body (10), said spacer body comprising:

- an inner wall (11) having a first width, said inner wall being perpendicular to the longitudinal direction Z,
- an outer wall (12) having a second width, said outer wall and said inner wall being separated by a first distance d1,
- two side walls (13, 14) having a height h, said two side walls being separated by a second distance d2,
- the inner wall (11), the outer wall (12) and the two side walls (13, 14) together are forming a chamber (50) suitable for containing a desiccant,
- optionally the spacer body further comprises two outer connection walls (15, 16) extending between said two side walls (13, 14) and said outer wall (12) such that the inner wall (11), the outer wall (12), the two side walls (13, 14) and the outer connection walls (15, 16) together are forming the chamber (50) suitable for containing a desiccant,
- optionally the spacer body further comprises two inner connection walls (17, 18) extending between said two side walls (13, 14) and said inner wall (11) such that that the inner wall (11), the outer wall (12), the two side walls (13, 14) and the inner connection walls together (17, 18) are forming the chamber (50) suitable for containing a desiccant; wherein spacer profile (1) further comprises a sealing element (100) **characterized in that** the sealing element (100) is in form of an elongated appendix (103) wherein:

  - said elongated appendix (103) is connected to the spacer body at a position being no more than 1/3 of the first distance d1 away from the inner wall (11)
  - said elongated appendix (103) extends in a direction from the inner wall and outwardly

and forming an angle α with an extension line of the side wall between 3 and 60 degrees

- said elongated appendix (103) has a length L1 being no more than ½ of the height h of the side walls (13, 14).

2. A spacer profile according to claim 1, wherein the elongated appendix is connected to the spacer body at the position of the inner wall.

3. A spacer profile according to claim 1 or 2, wherein said spacer body (10) further comprises a groove (104).

4. A spacer profile according to claim 3, wherein the groove (104) has a length L2 being larger than the length L1.

5. A spacer profile according to claims 1-4, wherein the spacer profile further comprises a diffusion barrier (60).

6. A spacer profile according to claim 5, wherein the diffusion barrier (60) is made of a polymeric material optionally sputtered with SiOx, where X is a number from and including 0 up to and including 2.

7. A spacer profile according to claim 6, wherein the diffusion barrier (60) has a bending pattern comprising at least four bendings, where the first bending (61) is a bending of at least 80°, preferably at least 90° and/or a last bending (62) of 180° thereby forming two substantially parallel and overlapping layers.

8. A spacer profile according to claim 5, wherein the groove (104) is formed by the diffusion barrier (60) .

9. A spacer profile according to any one of the preceding claims, wherein at least part of the profile body is made of a polymeric material .

10. A spacer profile according to claim 9, wherein elongated appendix (103) and the profile body is made of the same polymeric material.

11. An IG unit comprising at least two panes (4, 5) arranged opposite to each other and spaced apart with a spacer frame thereby forming an intervening space (3) therebetween, said spacer frame is made from a spacer profile (1) comprising a spacer body (10), said spacer body (10) comprising:

- an inner wall (11) having a first width, said inner wall being perpendicular to the longitudinal direction Z,
- an outer wall (12) having a second width, said outer wall (12) and said inner wall (11) being separated by a first distance d1,
- two side walls (13, 14) having a height h, said two side walls (13, 14) being separated by a second distance d2,
- the inner wall (11), the outer wall (12) and the two side walls (13, 14) together are forming a chamber (50) suitable for containing a desiccant
- optionally the spacer body (10) further comprises two outer connection walls (15, 16) extending between said two side walls (13, 14) and said outer wall (12) such that the inner wall (11), the outer wall (12), the two side walls (13, 14) and the outer connection walls (15, 16) together are forming the chamber (50) suitable for containing a desiccant
- optionally the spacer body (10) further comprises two inner connection walls (17, 18) extending between said two side walls (13, 14) and said inner wall (11) such that that the inner wall (11), the outer wall (12), the two side walls (13, 14) and the inner connection walls (17, 18) together are forming the chamber (50) suitable for containing a desiccant
- a primary sealant (6),

characterized in that the IG unit (2) further comprises a sealing element (100) positioned on and/or adjacent to an outer surface (32) of the side walls of the spacer body (10) said sealing element (100) is in form of an elongated appendix (103) wherein:

- said elongated appendix is connected to the spacer body at a position being no more than 1/3 of the first distance d1 away from the inner wall (11)
- said elongated appendix extends in a direction from the inner wall (11) and outwardly and forming an angle α with an extension line of the side wall between 3 and 60 degrees
- said elongated appendix has a length L1 being no more than ½ of the height h of the side walls (13, 14).

12. An IG unit comprising a spacer profile according to any one of claims 1- 9.

13. Use of a spacer profile according to any one of claims 1-9 in an IG unit.

14. A method for producing an IG unit comprising the steps of

- providing at least two panes
- bending a spacer profile (1) into a spacer frame, wherein the spacer profile comprises a spacer body (10), said spacer body comprising:
  - an inner wall (11) having a first width, said

inner wall being perpendicular to the longitudinal direction Z,
◦ an outer wall (12) having a second width, said outer wall and said inner wall being separated by a first distance d1,
◦ two side walls (13,14) having a height h, said two side walls being separated by a second distance d2,
◦ the inner wall (11), the outer wall (12) and the two side walls (13, 14) together are forming a chamber (50) suitable for containing a desiccant,
◦ optionally the spacer body further comprises two outer connection walls (15, 16) extending between said two side walls (13, 14) and said outer wall (12) such that the inner wall (11), the outer wall (12), the two side walls (13, 14) and the outer connection walls (15, 16) together are forming the chamber (50) suitable for containing a desiccant,

- sealing the at least two panes to the spacer frame by means of a primary sealant,
- optionally fixing and/or further sealing with a secondary sealant,

wherein the spacer body (10) further a sealing element (100) **characterized in that** the sealing element (100) is in form of an elongated appendix (103) wherein:

- said elongated appendix (103) is connected to the spacer body at a position being no more than 1/3 of the first distance d1 away from the inner wall (11)
- said elongated appendix (103) extends in a direction from the inner wall and outwardly and forming an angle α with an extension line of the side wall between 3 and 60 degrees

- - said elongated appendix (103) has a length L1 being no more than ½ of the height h of the side walls (13, 14).

Wand durch eine erste Distanz d1 getrennt sind,
- zwei Seitenwände (13, 14) mit einer Höhe h, wobei jene zwei Seitenwände durch eine zweite Distanz d2 getrennt sind,
- die innere Wand (11), die äußere Wand (12) und die zwei Seitenwände (13, 14) zusammen eine Kammer (50) bilden, die geeignet ist, ein Trocknungsmittel zu enthalten,
- optional wobei der Abstandshalterkörper ferner zwei äußere Verbindungswände (15, 16) umfasst, die sich zwischen jenen zwei Seitenwänden (13, 14) und jener äußeren Wand (12) erstrecken, so dass die innere Wand (11), die äußere Wand (12), die zwei Seitenwände (13, 14) und die äußeren Verbindungswände (15, 16) zusammen die Kammer (50) bilden, die geeignet ist, ein Trocknungsmittel zu enthalten,
- optional wobei der Abstandshalterkörper ferner zwei innere Verbindungswände (17, 18) umfasst, die sich zwischen jenen zwei Seitenwänden (13, 14) und jener inneren Wand (11) erstrecken, so dass die innere Wand (11), die äußere Wand (12), die zwei Seitenwände (13, 14) und die inneren Verbindungswände (17, 18) zusammen die Kammer (50) bilden, die geeignet ist, ein Trocknungsmittel zu enthalten;
wobei das Abstandshalterprofil (1) ferner ein Versiegelungselement (100) umfasst, das dadurch charakterisiert ist, dass das Versiegelungselement (100) in Form eines verlängerten Anhangs (103) ist, wobei:

- jener verlängerte Anhang (103) mit dem Abstandshalterkörper an einer Position verbunden ist, die nicht mehr als 1/3 der ersten Distanz d1 entfernt von der inneren Wand (11) ist,
- jener verlängerte Anhang (103) sich in eine Richtung der inneren Wand und nach außen erstreckt und die einen Winkel α mit einer Verlängerungslinie der Seitenwand zwischen 3 und 60 Grad bildet,
- jener verlängerte Anhang (103) eine Länge L1 hat, die nicht mehr als 1/2 der Höhe h der Seitenwände (13, 14) ist.

Patentansprüche

1. Ein Abstandshalterprofil (1), das sich in longitudinaler Richtung Z erstreckt und einen Abstandshalterkörper (10) umfasst, wobei jener Abstandshalterkörper umfasst:

   - eine innere Wand (11) mit einer ersten Breite, wobei jene innere Wand rechtwinklig zur longitudinalen Richtung Z ist,
   - eine äußere Wand (12) mit einer zweiten Breite, wobei jene äußere Wand und jene innere

2. Ein Abstandshalterprofil nach Anspruch 1, wobei der verlängerte Anhang mit dem Abstandshalterkörper an einer Position der inneren Wand verbunden ist.

3. Ein Abstandshalterprofil nach Anspruch 1 oder 2, wobei jener Abstandshalterkörper (10) ferner eine Kerbe (104) umfasst.

4. Ein Abstandshalterprofil nach Anspruch 3, wobei die Kerbe (104) eine Länge L2 hat, die größer ist als die Länge L1.

5. Ein Abstandshalterprofil nach den Ansprüchen 1-4, wobei das Abstandshalterprofil ferner eine Diffusionsbarriere (60) umfasst.

6. Ein Abstandshalterprofil nach Anspruch 5, wobei die Diffusionsbarriere (60) aus einem Polymermaterial hergestellt ist, optional zerstäubt mit SiO_x, wobei X eine Zahl von und einschließlich 0 bis zu und einschließlich 2 ist.

7. Ein Abstandshalterprofil nach Anspruch 6, wobei die Diffusionsbarriere (60) ein Krümmungsmuster hat, das mindestens vier Krümmungen umfasst, wobei die erste Krümmung (61) eine Krümmung von mindestens 80° ist, bevorzugt mindestens 90° und/oder eine letzte Krümmung (62) von 180° ist und damit zwei substantiell parallele und übereinanderliegende Schichten bildet.

8. Ein Abstandshalterprofil nach Anspruch 5, wobei die Kerbe (104) durch die Diffusionsbarriere (60) gebildet wird.

9. Ein Abstandshalterprofil nach einem der vorhergehenden Ansprüche, wobei mindestens ein Teil des Abstandshalterkörpers aus einem Polymermaterial hergestellt ist.

10. Ein Abstandshalterprofil nach Anspruch 9, wobei der verlängerte Anhang (103) und der Profilkörper aus demselben Polymermaterial hergestellt sind.

11. Eine IG Einheit mit mindestens zwei Scheiben (4, 5) die gegenüberliegend zueinander angeordnet sind und mit einem Abstandhalterrahmen voneinander getrennt sind, wobei dazwischen ein Zwischenraum (3) gebildet wird, wobei jener Abstandshalterrahmen aus einem Abstandshalterprofil (1) hergestellt ist, das einen Abstandshalterkörper (10) umfasst, wobei jener Abstandshalterkörper (10) umfasst:

- eine innere Wand (11) mit einer ersten Breite, wobei jene innere Wand rechtwinklig zur longitudinalen Richtung Z ist,
- eine äußere Wand (12) mit einer zweiten Breite, wobei jene äußere Wand und jene innere Wand durch eine erste Distanz d1 getrennt sind,
- zwei Seitenwände (13, 14) mit einer Höhe h, wobei jene zwei Seitenwände (13, 14) durch eine zweite Distanz d2 getrennt sind,
- die innere Wand (11), die äußere Wand (12) und die zwei Seitenwände (13, 14) zusammen eine Kammer (50) bilden, die geeignet ist, ein Trocknungsmittel zu enthalten,
- optional wobei der Abstandshalterkörper (10) ferner zwei äußere Verbindungswände (15, 16) umfasst, die sich zwischen jenen zwei Seitenwänden (13, 14) und jener äußeren Wand (12) erstrecken, so dass die innere Wand (11), die äußere Wand (12), die zwei Seitenwände (13, 14) und die äußeren Verbindungswände (15, 16) zusammen die Kammer (50) bilden, die geeignet ist, ein Trocknungsmittel zu enthalten,
- optional wobei der Abstandshalterkörper (10) ferner zwei innere Verbindungswände (17, 18) umfasst, die sich zwischen jenen zwei Seitenwänden (13, 14) und jener inneren Wand (11) erstrecken, so dass die innere Wand (11), die äußere Wand (12), die zwei Seitenwände (13, 14) und die inneren Verbindungswände (17, 18) zusammen die Kammer (50) bilden, die geeignet ist, ein Trocknungsmittel zu enthalten;
- einen primären Dichtstoff (6), dadurch charakterisiert, dass die IG Einheit (2) ferner ein Versiegelungselement (100) umfasst, das auf und/oder neben einer äußeren Oberfläche (32) der Seitenwände des Abstandshalterkörpers (10) positioniert ist, wobei jenes Versiegelungselement (100) in Form eines verlängerten Anhangs (103) ist, wobei:

    - jener verlängerte Anhang mit dem Abstandshalterkörper an einer Position verbunden ist, die nicht mehr als 1/3 der ersten Distanz d1 entfernt von der inneren Wand (11) ist,
    - jener verlängerte Anhang sich in eine Richtung der inneren Wand und nach außen erstreckt und die einen Winkel α mit einer Verlängerungslinie der Seitenwand zwischen 3 und 60 Grad bildet,
    - jener verlängerte Anhang eine Länge L1 hat, die nicht mehr als 1/2 der Höhe h der Seitenwände (13, 14) ist.

12. Eine IG Einheit, die ein Abstandshalterprofil nach einem der Ansprüche 1-9 umfasst.

13. Die Verwendung eines Abstandshalterprofils nach einem der Ansprüche 1-9 in einer IG Einheit.

14. Ein Verfahren zur Herstellung einer IG Einheit, umfassend die Schritte von

- Bereitstellen von mindestens zwei Scheiben,
- Krümmen eines Abstandshalterprofils (1) in einen Abstandshalterrahmen, wobei das Abstandshalterprofil einen Abstandshalterkörper (10) umfasst, wobei jener Abstandshalterkörper umfasst:

    ◦ eine innere Wand (11) mit einer ersten Breite, wobei jene innere Wand rechtwinklig zur longitudinalen Richtung Z ist,
    ◦ eine äußere Wand (12) mit einer zweiten Breite, wobei jene äußere Wand und jene

innere Wand durch eine erste Distanz d1 getrennt sind,
◦ zwei Seitenwände (13, 14) mit einer Höhe h, wobei jene zwei Seitenwände durch eine zweite Distanz d2 getrennt sind,
◦ die innere Wand (11), die äußere Wand (12) und die zwei Seitenwände (13, 14) zusammen eine Kammer (50) bilden, die geeignet ist, ein Trocknungsmittel zu enthalten,
◦ optional wobei der Abstandshalterkörper ferner zwei äußere Verbindungswände (15, 16) umfasst, die sich zwischen jenen zwei Seitenwänden (13, 14) und jener äußeren Wand (12) erstrecken, so dass die innere Wand (11), die äußere Wand (12), die zwei Seitenwände (13, 14) und die äußeren Verbindungswände (15, 16) zusammen die Kammer (50) bilden, die geeignet ist, ein Trocknungsmittel zu enthalten,

- Versiegeln der mindestens zwei Scheiben an den Abstandshalterrahmen unter Verwendung eines primären Dichtstoffs,
- optional Befestigen und/oder ferner Versiegeln mit einem zweiten Dichtstoff, wobei der Abstandshalterkörper (10) ferner ein Versiegelungselement (100) umfasst, das dadurch charakterisiert ist, dass das Versiegelungselement (100) in Form eines verlängerten Anhangs (103) ist, wobei:

- jener verlängerte Anhang (103) mit dem Abstandshalterkörper an einer Position verbunden ist, die nicht mehr als 1/3 der ersten Distanz d1 entfernt von der inneren Wand (11) ist,
- jener verlängerte Anhang (103) sich in eine Richtung der inneren Wand und nach außen erstreckt und die einen Winkel α mit einer Verlängerungslinie der Seitenwand zwischen 3 und 60 Grad bildet,
- jener verlängerte Anhang (103) eine Länge L1 hat, die nicht mehr als 1/2 der Höhe h der Seitenwände (13, 14) ist.

Revendications

1. Profilé d'espaceur (1) s'étendant dans une direction longitudinale Z et comprenant un corps d'espaceur (10), ledit corps d'espaceur comprenant :

- une paroi intérieure (11) ayant une première largeur, ladite paroi intérieure étant perpendiculaire à la direction longitudinale Z,
- une paroi extérieure (12) ayant une deuxième largeur, ladite paroi extérieure et ladite paroi intérieure étant séparées par une première distance d1,
- deux parois latérales (13, 14) ayant une hauteur h, lesdites deux parois latérales étant séparées par une deuxième distance d2,
- la paroi intérieure (11), la paroi extérieure (12) et les deux parois latérales (13, 14) forment ensemble une chambre (50) apte à contenir un dessiccant,
- éventuellement, le corps d'espaceur comprend en outre deux parois de liaison extérieures (15, 16) s'étendant entre lesdites deux parois latérales (13, 14) et ladite paroi extérieure (12) de façon à ce que la paroi intérieure (11), la paroi extérieure (12), les deux parois latérales (13, 14) et les parois de liaison extérieures (15, 16) forment ensemble la chambre (50) apte à contenir un dessiccant,
- éventuellement, le corps d'espaceur comprend en outre deux parois de liaison intérieures (17, 18) s'étendant entre lesdites deux parois latérales (13, 14) et ladite paroi intérieure (11) de façon à ce que la paroi intérieure (11), la paroi extérieure (12), les deux parois latérales (13, 14) et les parois de liaison intérieures (17, 18) forment ensemble la chambre (50) apte à contenir un dessiccant ; dans lequel le profilé d'espaceur (1) comprend en outre un élément de scellant (100) **caractérisé en ce que** l'élément de scellant (100) est réalisé sous forme d'un appendice allongé (103) dans lequel :

- ledit appendice allongé (103) est lié au corps d'espaceur à une position n'étant pas supérieure à 1/3 de la première distance d1 de la paroi intérieure (11)
- ledit appendice allongé (103) s'étend dans une direction allant de la paroi intérieure vers l'extérieur et formant un angle a avec une ligne d'extension de la paroi latérale compris entre 3 et 60 degrés
- ledit appendice allongé (103) présente une longueur L1 n'étant pas supérieure à 1/2 de la hauteur h des parois latérales (13, 14).

2. Profilé d'espaceur selon la revendication 1, dans lequel l'appendice allongé est lié au corps d'espaceur à la position de la paroi intérieure.

3. Profilé d'espaceur selon la revendication 1 ou 2, dans lequel ledit corps d'espaceur (10) comprend en outre une rainure (104).

4. Profilé d'espaceur selon la revendication 3, dans lequel la rainure (104) a une longueur L2 supérieure à la longueur L1.

5. Profilé d'espaceur selon les revendications 1 à 4, dans lequel le profil d'espaceur comprend en outre une barrière de diffusion (60).

6. Profilé d'espaceur selon la revendication 5, dans lequel la barrière de diffusion (60) est réalisée dans un matériau polymère éventuellement pulvérisé avec du SiOx, où X est un nombre de 0 inclus à 2 inclus.

7. Profilé d'espaceur selon la revendication 6, dans lequel la barrière de diffusion (60) présente un motif de courbure comprenant au moins quatre courbures, la première courbure (61) étant une courbure d'au moins 80°, de préférence d'au moins 90° et/ou une dernière courbure (62) de 180° formant ainsi deux couches sensiblement parallèles et se chevauchant.

8. Profilé d'espaceur selon la revendication 5, dans lequel la rainure (104) est formée par la barrière de diffusion (60).

9. Profilé d'espaceur selon l'une quelconque des revendications précédentes, dans lequel au moins une partie du corps du profilé est réalisée dans un matériau polymère.

10. Profilé d'espaceur selon la revendication 9, dans lequel l'appendice allongé (103) et le corps du profilé sont réalisés dans le même matériau polymère.

11. Unité de verre isolant IG comprenant au moins deux vitres (4, 5) disposées en vis-à-vis et espacées par un cadre d'espaceur formant ainsi un espace intermédiaire (3) entre elles, ledit cadre d'espaceur étant réalisé à partir d'un profilé d'espaceur (1) comprenant un corps d'espaceur (10), ledit corps d'espaceur (10) comprenant :

- une paroi intérieure (11) ayant une première largeur, ladite paroi intérieure étant perpendiculaire à la direction longitudinale Z,
- une paroi extérieure (12) ayant une deuxième largeur, ladite paroi extérieure (12) et ladite paroi intérieure (11) étant séparées par une première distance d1,
- deux parois latérales (13, 14) ayant une hauteur h, lesdites deux parois latérales (13, 14) étant séparées par une deuxième distance d2,
- la paroi intérieure (11), la paroi extérieure (12) et les deux parois latérales (13, 14) forment ensemble
une chambre (50) apte à contenir un dessiccant
- éventuellement, le corps d'espaceur (10) comprend en outre deux parois de liaison extérieures (15, 16) s'étendant entre lesdites deux parois latérales (13, 14) et ladite paroi extérieure (12) de façon à ce que la paroi intérieure (11), la paroi extérieure (12), les deux parois latérales (13, 14) et les parois de liaison extérieures (15, 16) forment ensemble la chambre (50) apte à contenir un dessiccant
- éventuellement, le corps d'espaceur (10) comprend en outre deux parois de liaison intérieures (17, 18) s'étendant entre lesdites deux parois latérales (13, 14) et ladite paroi intérieure (11) de façon à ce que la paroi intérieure (11), la paroi extérieure (12), les deux parois latérales (13, 14) et les parois de liaison intérieures (17, 18) forment ensemble la chambre (50) apte à contenir un dessiccant
- un scellant primaire (6),

caractérisé en ce que l'unité de verre isolant IG (2) comprend en outre un élément de scellant (100) positionné sur et/ou adjacent à une surface extérieure (32) des parois latérales du corps d'espaceur (10), ledit élément de scellant (100) se présentant sous la forme d'un appendice allongé (103) dans lequel :

- ledit appendice allongé est lié au corps d'espaceur à une position n'étant pas supérieure à 1/3 de la première distance d1 de la paroi intérieure (11)
- ledit appendice allongé s'étend dans une direction allant de la paroi intérieure (11) vers l'extérieur et formant un angle a avec une ligne d'extension de la paroi latérale compris entre 3 et 60 degrés
- ledit appendice allongé présente une longueur L1 n'étant pas supérieure à 1/2 de la hauteur h des parois latérales (13, 14).

12. Unité de verre isolant IG comprenant un profil d'espaceur selon l'une quelconque des revendications 1 à 9.

13. Utilisation d'un profil d'espaceur selon l'une quelconque des revendications 1 à 9 dans une unité de verre isolant IG.

14. Procédé de fabrication d'une unité de verre isolant IG comprenant les étapes consistant à :

- fournir au moins deux vitres
- plier un profilé d'espaceur (1) en un cadre d'espaceur, le profilé d'espaceur comprenant un corps d'espaceur (10), ledit corps d'espaceur comprenant :

◦ une paroi intérieure (11) ayant une première largeur, ladite paroi intérieure étant perpendiculaire à la direction longitudinale Z,

◦ une paroi extérieure (12) ayant une deuzième largeur, ladite paroi extérieure et ladite paroi intérieure étant séparées par une première distance d1,
◦ deux parois latérales (13,14) ayant une hauteur h, lesdites deux parois latérales étant séparées par une deuxième distance d2,
◦ la paroi intérieure (11), la paroi extérieure (12) et les deux parois latérales (13, 14) forment ensemble une chambre (50) apte à contenir un dessiccant,
◦ éventuellement, le corps d'espaceur comprend en outre deux parois de liaison extérieures (15, 16) s'étendant entre lesdites deux parois latérales (13, 14) et ladite paroi extérieure (12) de façon à ce que la paroi intérieure (11), la paroi extérieure (12), les deux parois latérales (13,14) et les parois de liaison extérieures (15, 16) forment ensemble la chambre (50) apte à contenir un dessiccant,

- sceller les au moins deux vitres au cadre d'espaceur au moyen d'un scellant primaire,
- éventuellement, fixer et/ou sceller en outre avec un scellant secondaire, dans lequel le corps d'espaceur (10) comprend en outre un élément de scellant (100) **caractérisé en ce que** l'élément de scellant (100) se présente sous une forme d'appendice allongé (103) dans lequel :

- ledit appendice allongé (103) est lié au corps d'espaceur à une position n'étant pas supérieure à 1/3 de la première distance d1 de la paroi intérieure (11)
- ledit appendice allongé (103) s'étend dans une direction allant de la paroi intérieure vers l'extérieur et formant un angle a avec une ligne d'extension de la paroi latérale compris entre 3 et 60 degrés
- - ledit appendice allongé (103) présente une longueur L1 n'étant pas supérieure à 1/2 de la hauteur h des parois latérales (13, 14).

FIG 1

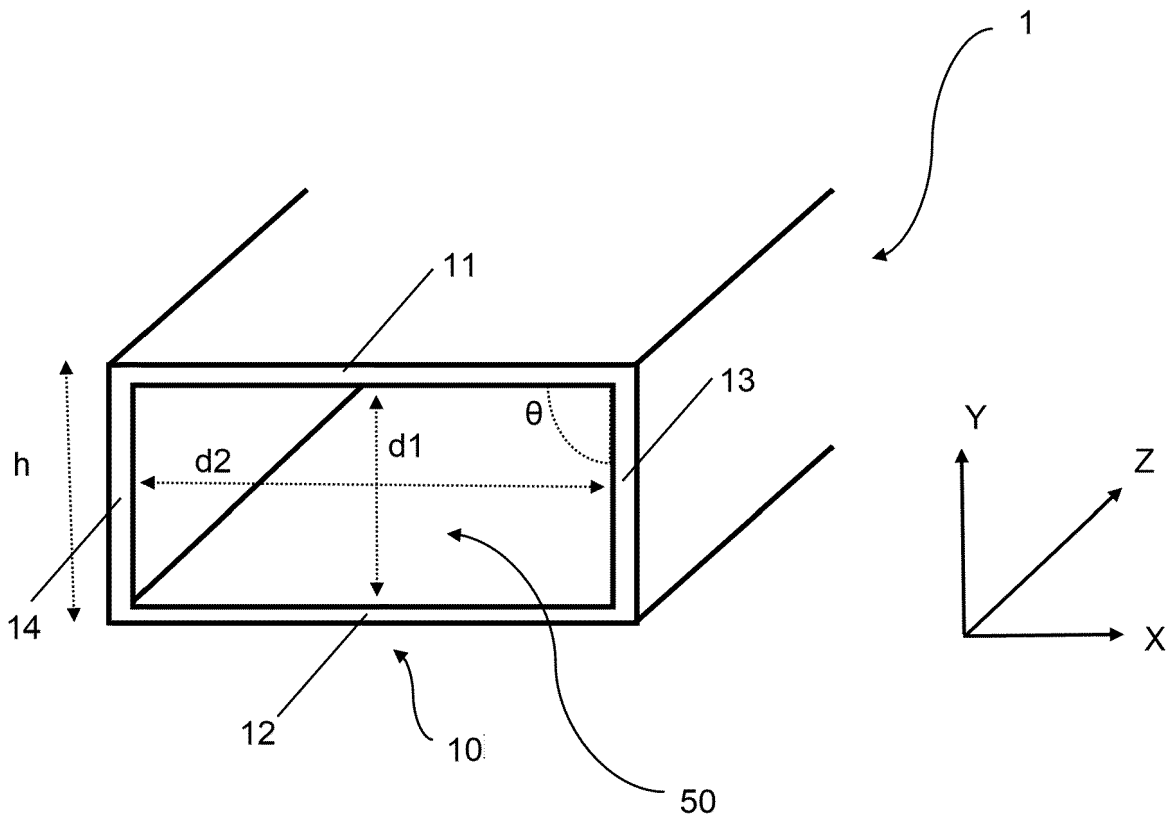


FIG 2a

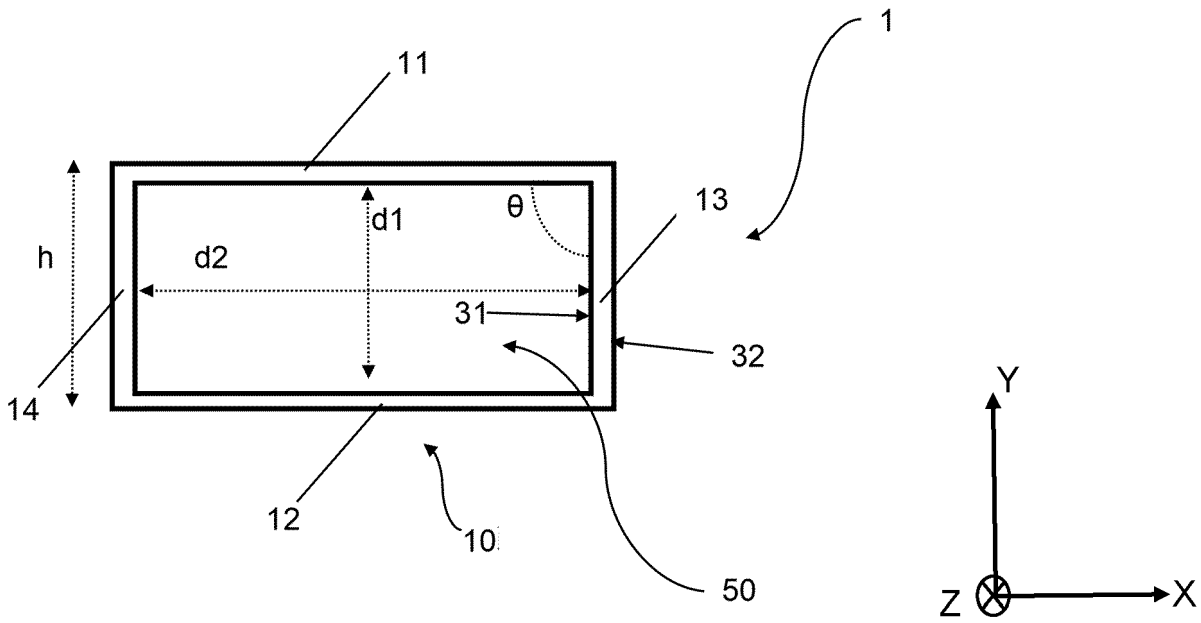

1
11
13
h
d1
θ
d2
31
32
14
12
10
50
Y
Z
X

FIG. 2b

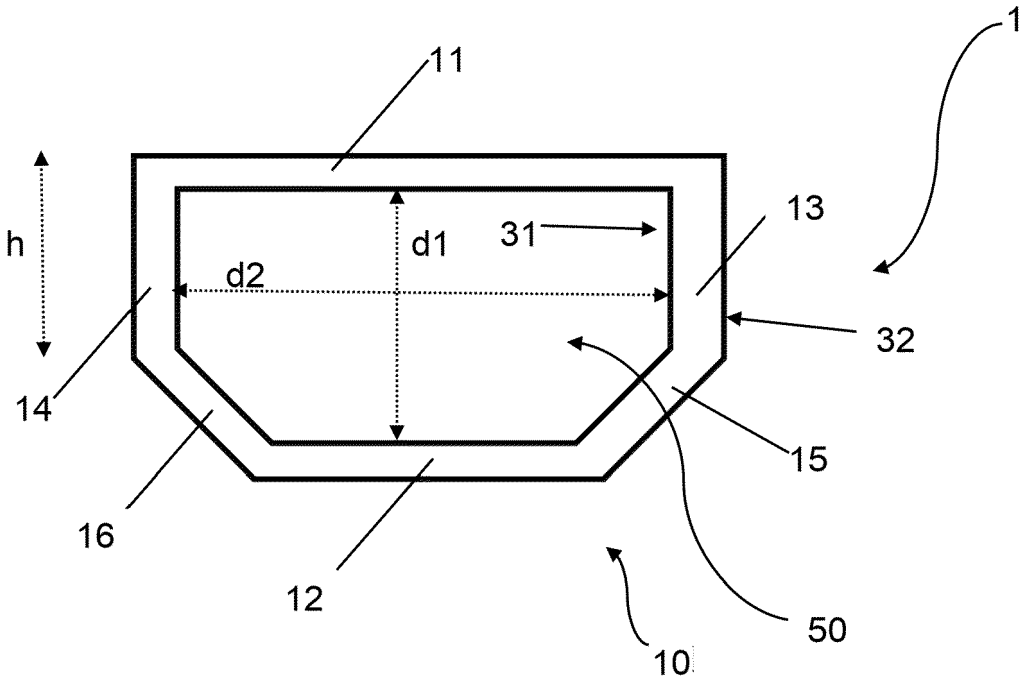

1
11
13
h
d1
31
d2
32
14
15
16
12
50
10

FIG 2c

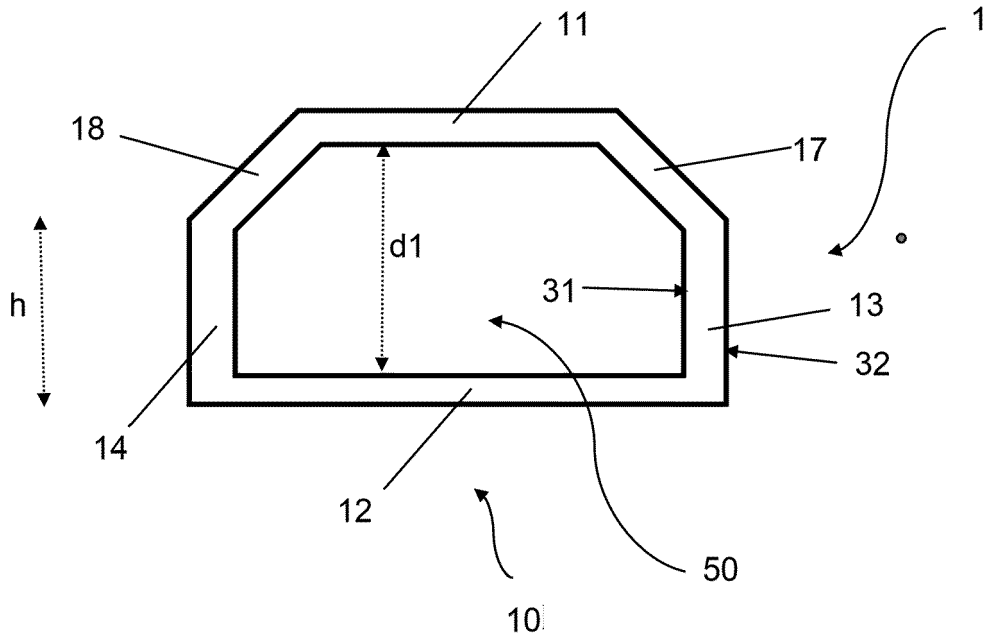

11
1
18
17
d1
h
31
13
32
14
12
50
10

FIG 2d

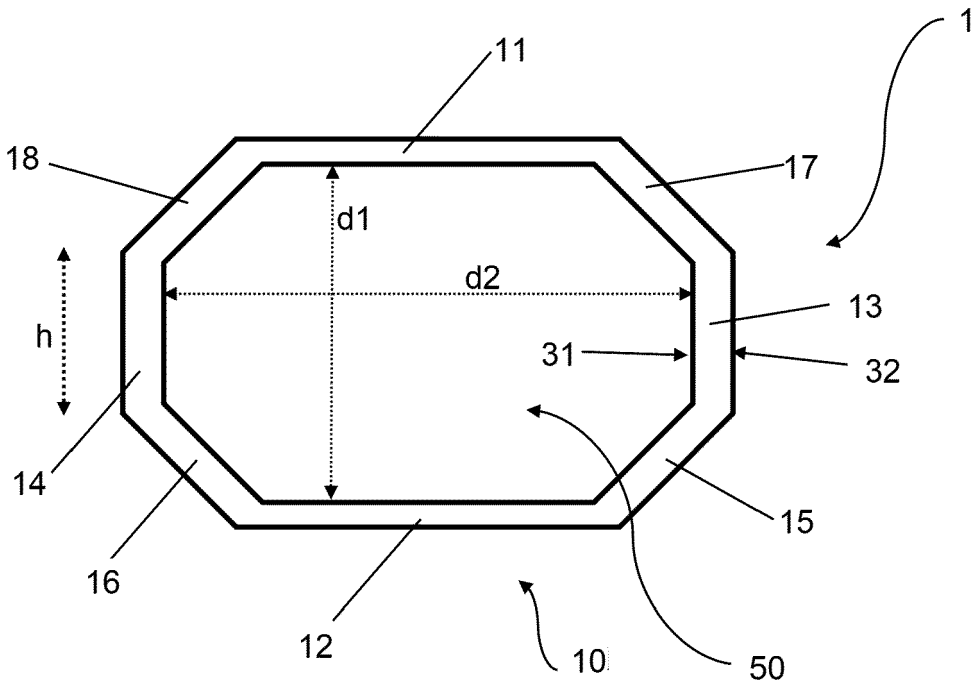

11
1
18
17
d1
d2
h
13
31
32
14
15
16
12
10
50

FIG 3a

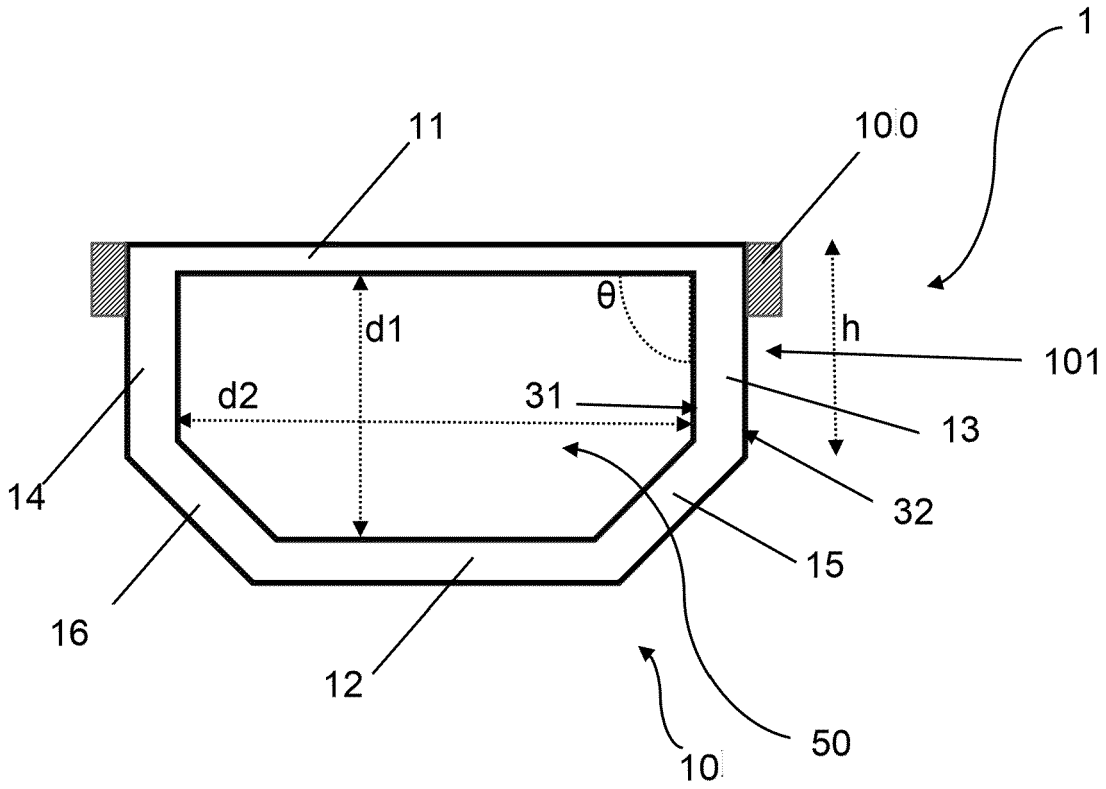

1
11
100
θ
d1
h
101
d2
31
13
14
32
15
16
12
50
10

FIG 3b

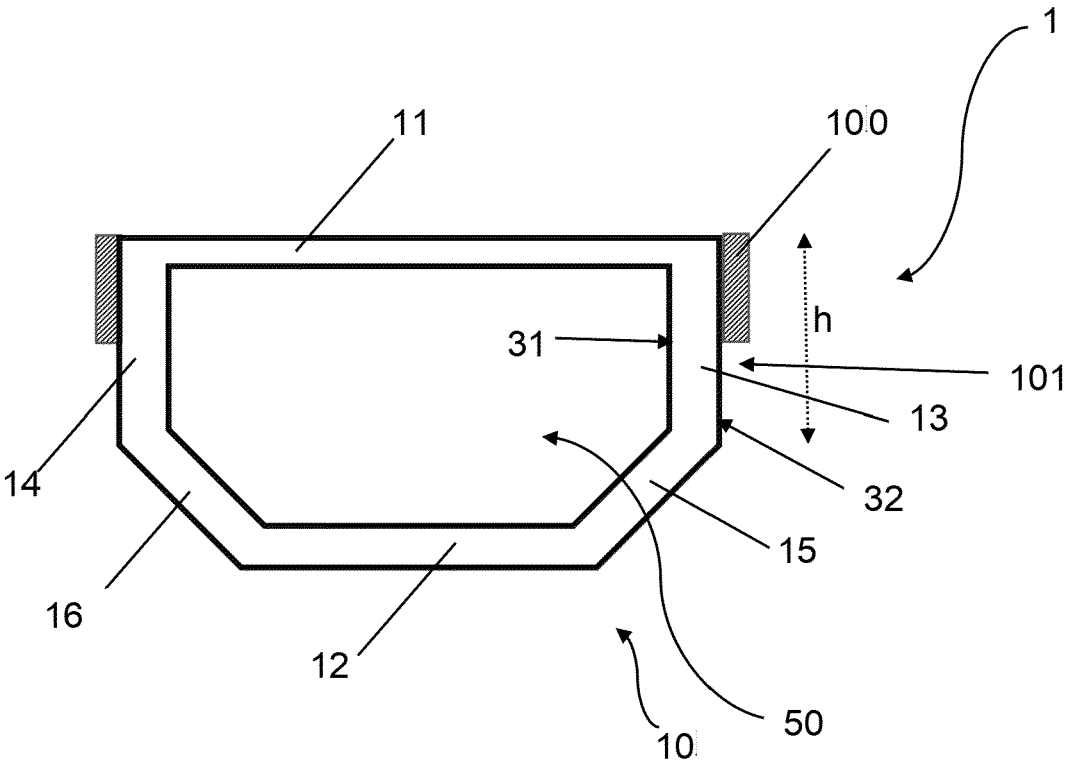

1
11
100
h
31
101
13
14
32
15
16
12
50
10

FIG 4a

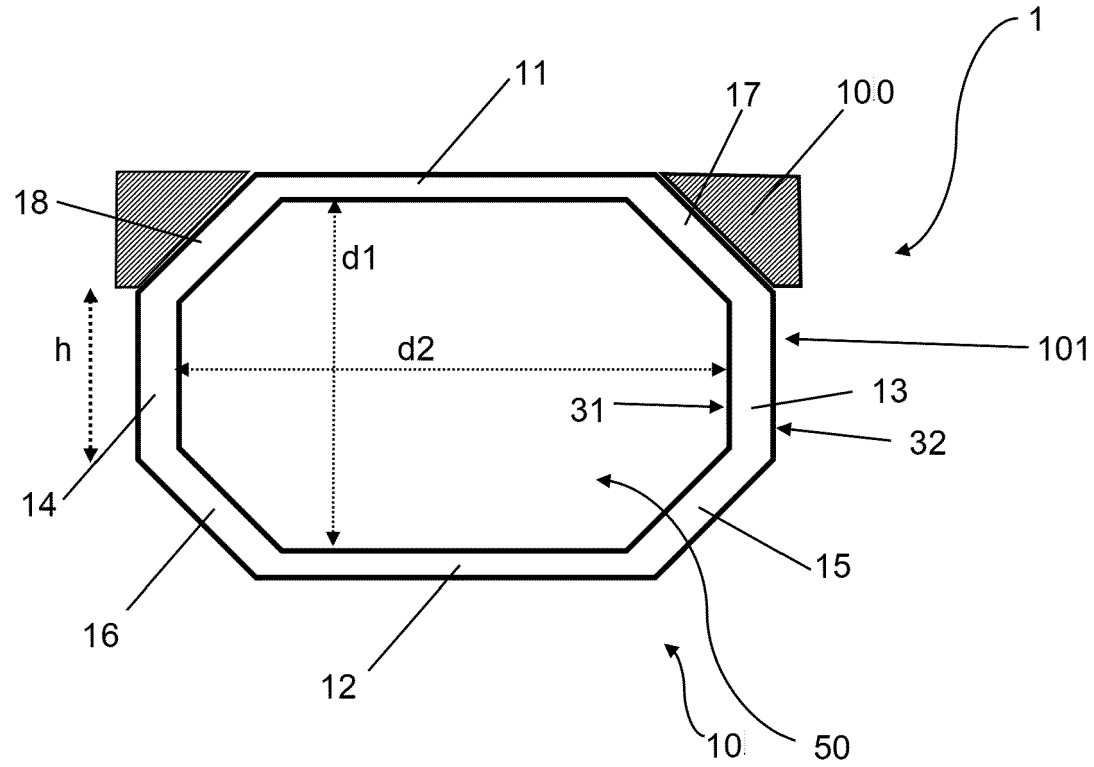

1
11
17
100
18
d1
h
d2
101
13
31
32
14
15
16
12
10
50

FIG 4b

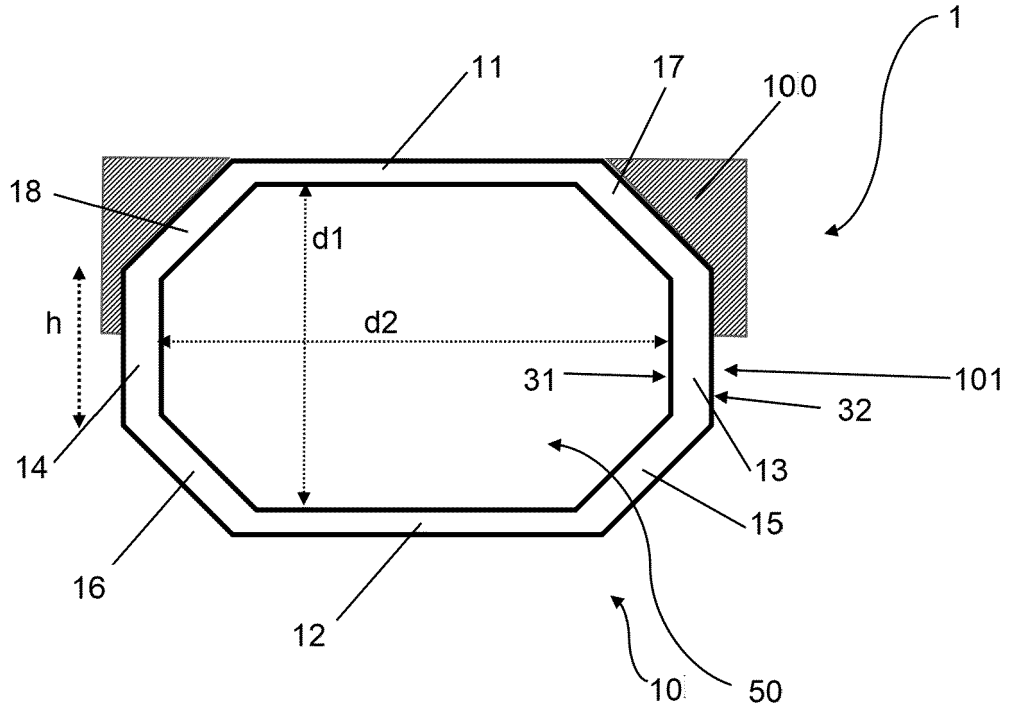

1
11
17
100
18
d1
h
d2
101
31
32
13
14
15
16
12
10
50

Fig 5

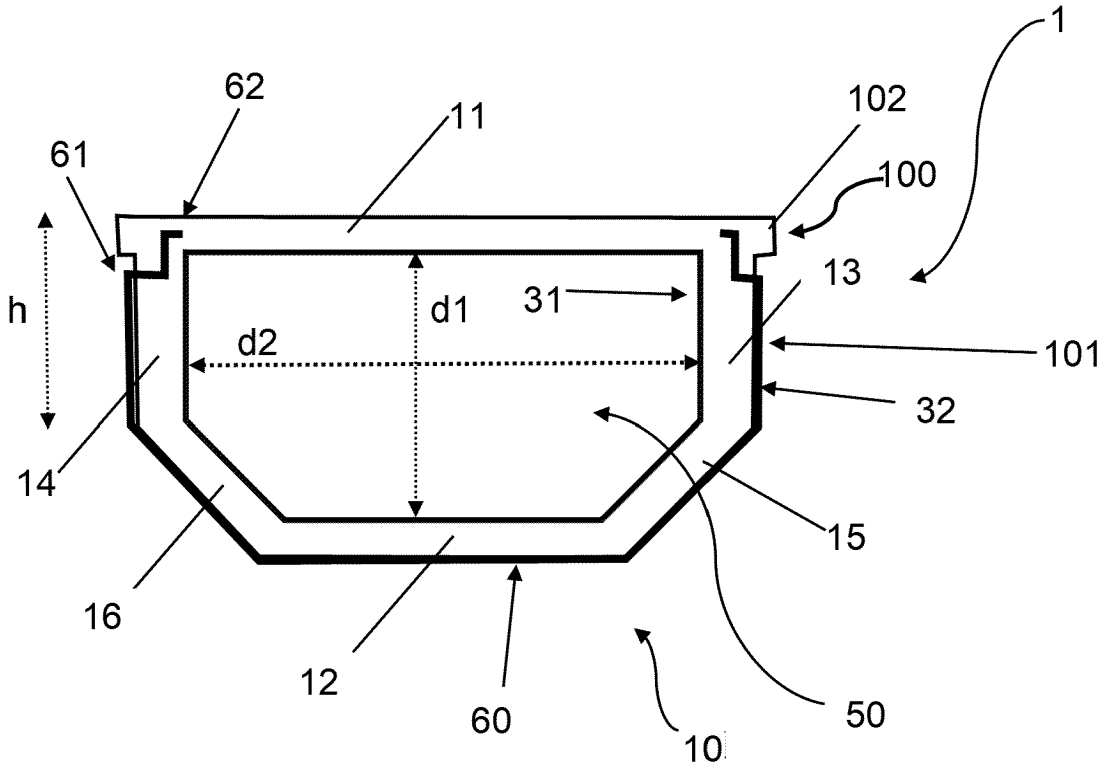


Fig 6

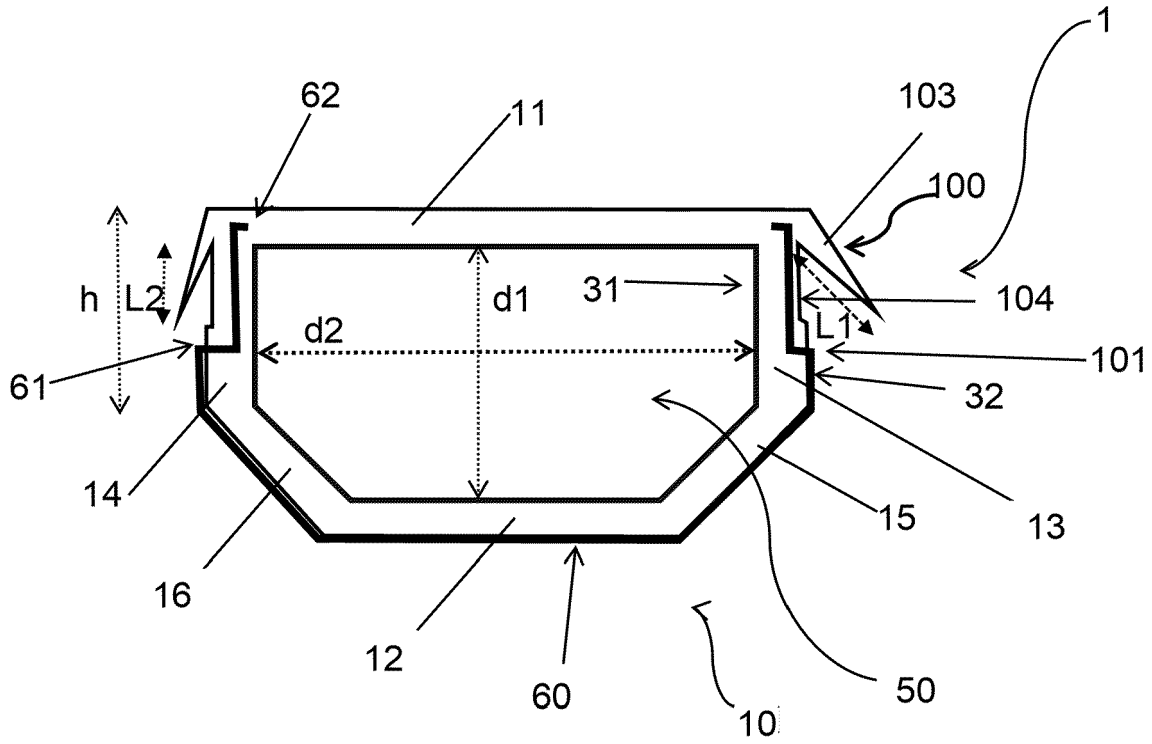


Fig 7

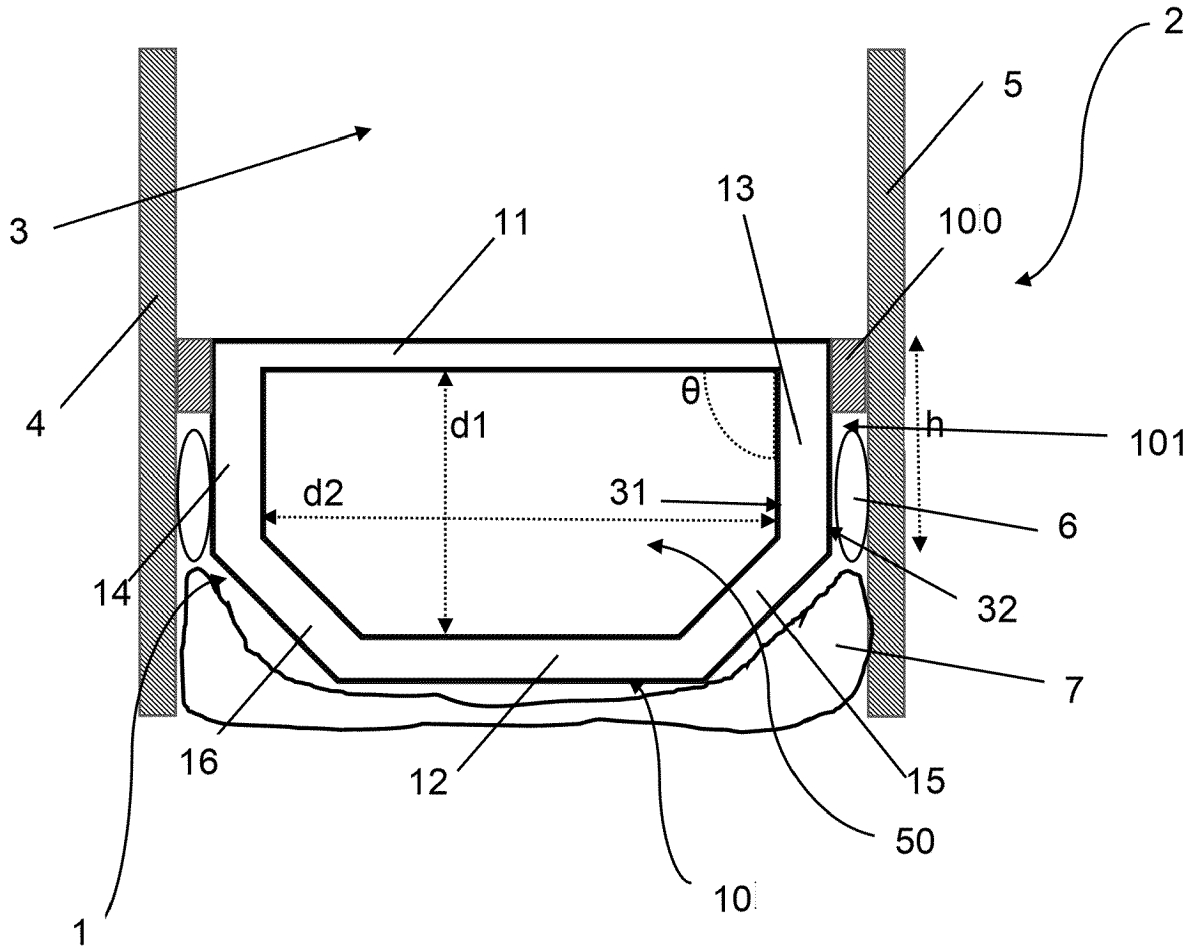


FIG 8

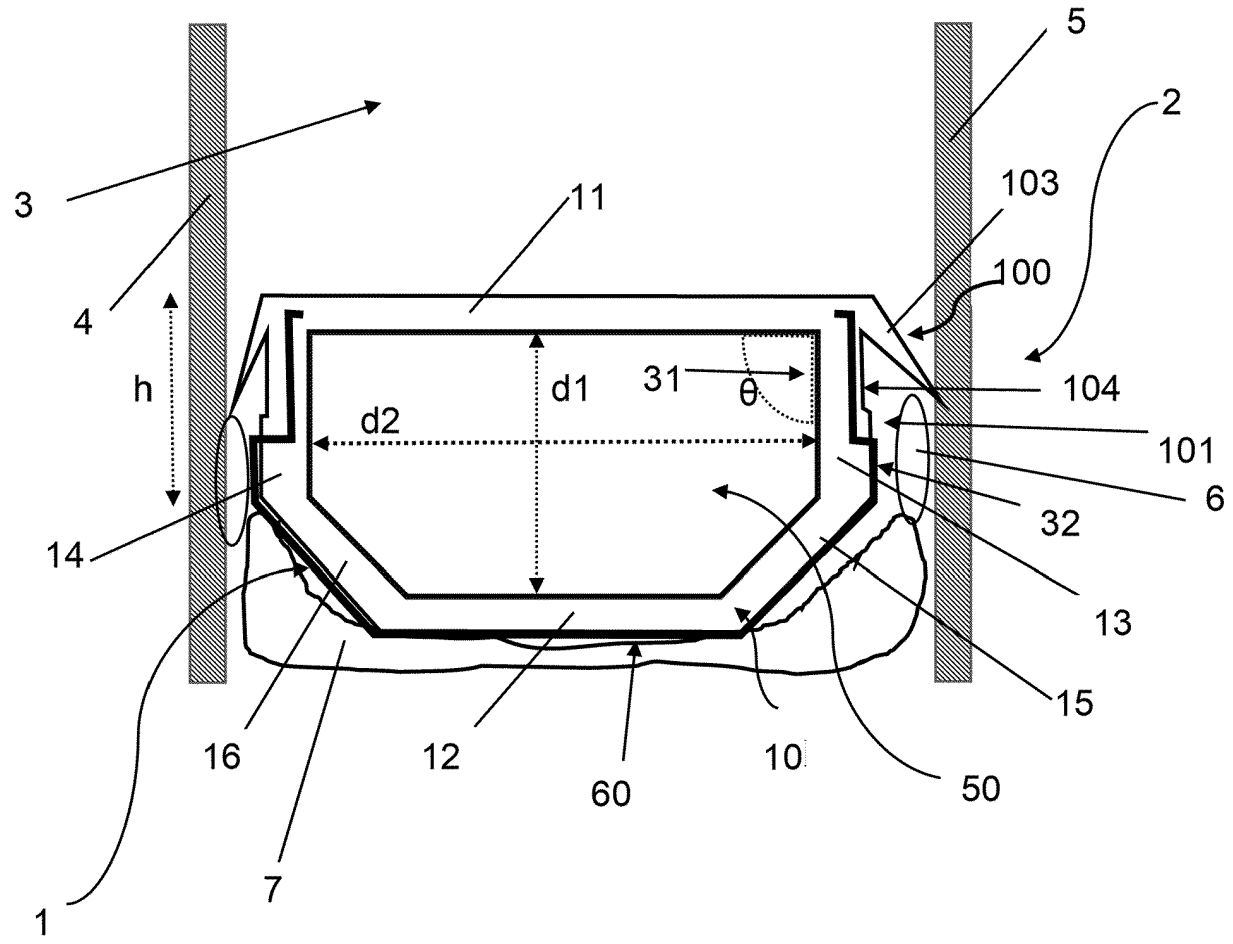


FIG 9

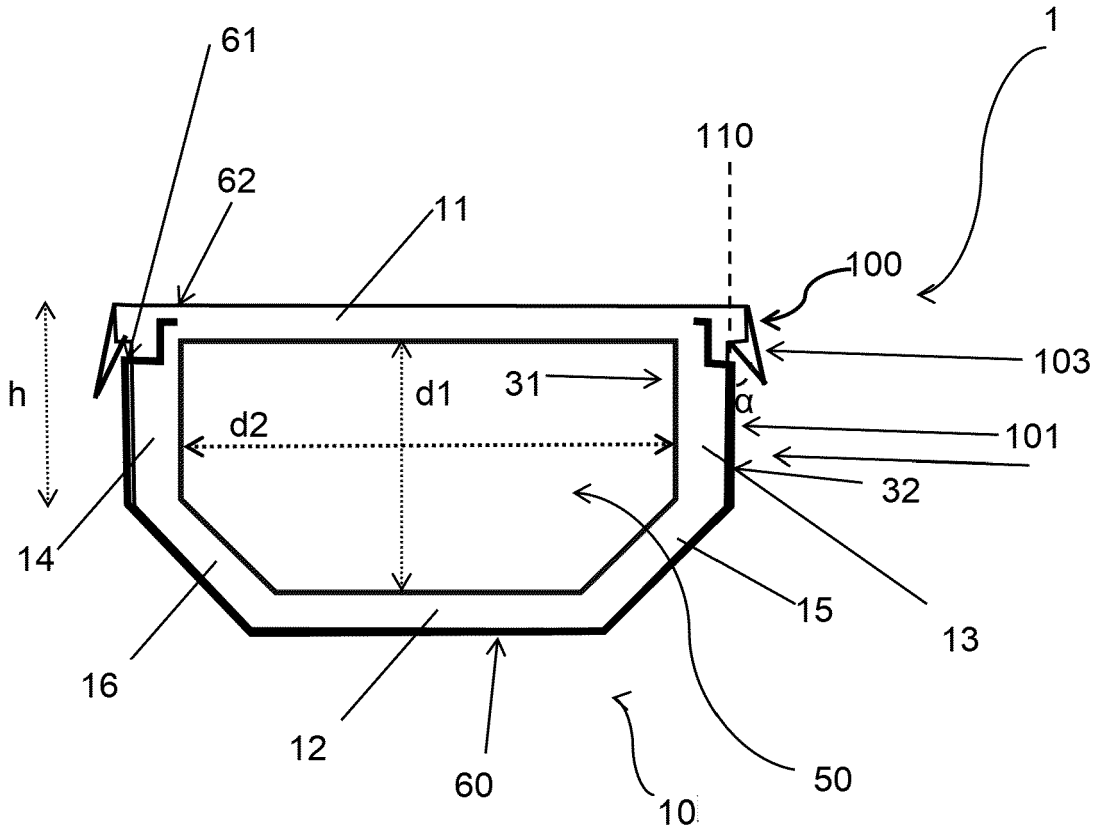
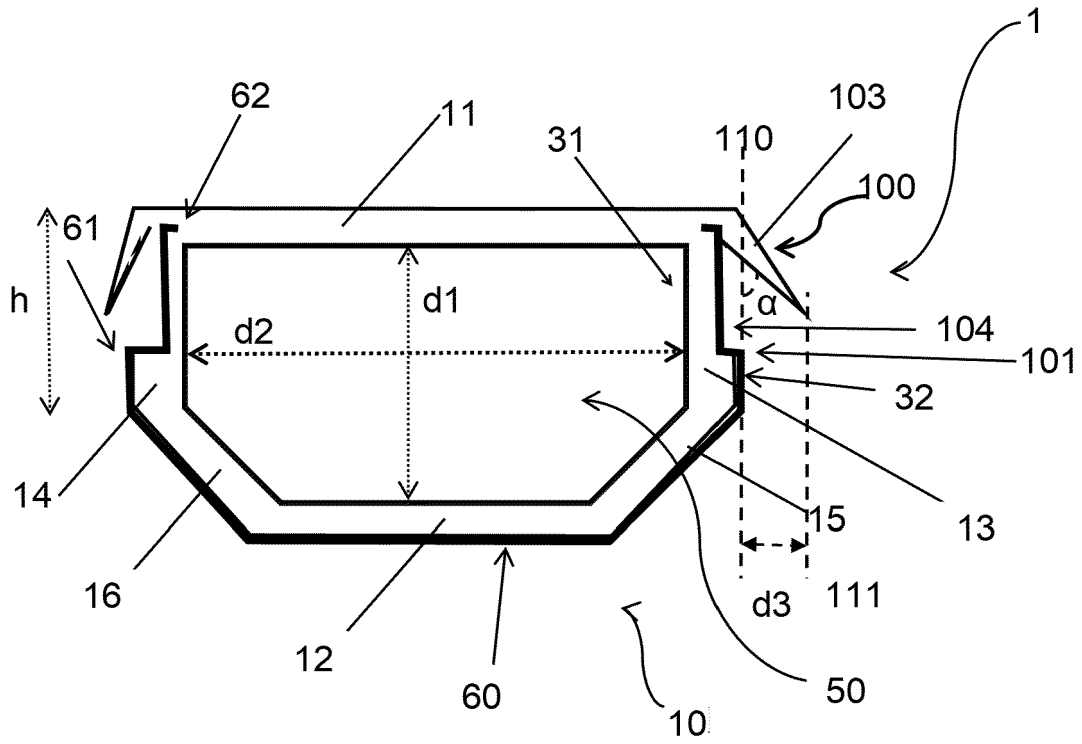


FIG 10


1
62
11
31
110
103
100
61
h
d1
d2
α
104
101
32
14
15
13
16
d3
111
12
60
50
10

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 202016008421 U1 **[0003]**
- US 2013305656 A1 **[0003]**
- DE 102011011549 A1 **[0003]**
- DE 3321878 A1 **[0003]**
- US 5512341 A **[0003]**