

SPECIFICATION

Improvements relating to structural sealants and composite structures including the same

This invention relates to an improvement in structural sealants. The invention has particular applicability to structural sealants used in the fabrication of thermal insulating, multiple glazed structures, and will be described with reference thereto. It will be appreciated, however, that the invention has other and broader applications limited only by the imagination of those skilled in the art to which the invention pertains.

In general, the procedure for assembling a multiple glazed structure involves placing one sheet of glass over the other in a fixed, spaced relationship, and then injecting a sealant composition into the space between the two sheets of glass, at and along the periphery of the two sheets, thereby forming a sandwich structure having a sealed air pocket.

Heretofore the means employed for maintaining the spacing between the sheets of glass was either of a temporary, removable nature, or of a permanent nature. Exemplary of temporary removable spacer means are those disclosed in U.S. Patents 2,275,812 and 3,097,061. U.S. Patents 3,758,996 and 4,113,905 show embodiments of permanently installed spacer means. U.S. Patent 3,758,996 also teaches the concept of incorporating a desiccant within the spacer means. The desiccant functions as a medium upon which moisture and organic materials in the sealed air pocket are sorbed. This prevents the moisture from condensing on and fogging the interior surfaces of the sheets of glass.

In practicing the teachings of the prior art, multiple steps are required. Where a removable spacer means is employed, the spacer means must be set in place, the sealant injected, the sealant cured, and the spacer means thereafter removed. Where a permanent spacer means is employed, and adhesive is applied to secure the permanent spacer to the glass sheets, the spacer is then set in place, and a sealant is then injected into the peripheral channel formed between the spacer and the edges of the sheets of glass.

These prior art practices are cumbersome, labor intensive and expensive, and are believed to have been instrumental in limiting the fabrication of energy saving, thermal insulating multiple glazing structures to factory assembly, and the installations thereof, to situations where cost effectiveness is established by very high energy costs.

Clearly, the prior art practices do not

readily lend themselves to on-the-job assembly, as is, for example required in retrofitting single glazed structures to thermal insulating multiple glazed structures. U.S. Patent 3,573,149 describes a rather complex prior art procedure for forming double glazed windows which can be used in retrofit applications. The procedure involves the use of a spacer member in which is embedded a resistance wire, and to which is appended a tubular member containing desiccant. The procedure involves cutting the thermo-electric spacer and sealing strip to the peripheral length of the panel with sufficient extra length to form electrical terminals for connection to a power supply source, unsheathing the ends of the resistance wire passing through the strip and applying an electric potential thereto to heat the strip until it becomes pliable, applying the strip to the perimeter of one panel, reapplying an electric potential to the resistance wire to soften the strip, aligning a second panel and pressing the panels together, again applying an electric potential to cure the strip, and trimming off the ends of the strip.

In addition to being a cumbersome and undoubtedly expensive procedure, it should be noted that the thermo-electric spacer and sealing strip employed in the patented arrangement does not provide any means for positively maintaining a predetermined space between the panels. Indeed, the patentees state that the glass panes are gently but firmly pressed together until the sealing strip "shows a black vitreous effect all around."

Other references, of general interest in showing the state of the art are U.S. Patents 2,695,430 and 3,045,297, and British Patent 605,234 all of which show the use of various rigid spacer member and separators for multiple pane window units, luminous panels and the like.

Against this background of cumbersome, inefficient methodology, and multicomponent materials and structures for assembling multiple glazing structures it is an object of the present invention to provide a unitary, sealant and spacer which incorporates a desiccant, the use of which in assembling multiple glazing structures simplifies the methodology, reduces costs and permits assembly to be conducted on-site as a retrofit activity, or in a factory, with equal facility.

The invention includes a unitary sealant and spacer strip incorporating a desiccant and comprising an elongate ribbon of a deformable sealant enveloping and having embedded therein a unitary spacer means extending longitudinally the entire length of said ribbon of sealant, said sealant being of a substantially common cross sectional

configuration along its entire length and having substantially flat, substantially parallel, opposed surfaces, said spacer means having surfaces and edges all of which are
5 enveloped by and in intimate contact with said sealant along the entire length of said spacer means and said sealant, said spacer means being capable of resisting compressive forces exerted in the plane normal to
10 the substantially flat, substantially parallel opposed surfaces of said sealant, the thickness of said enveloping sealant extending beyond said spacer means in at least said plane, and being sufficient to maintain a
15 continuous sealing interface under applied compressive forces, but insufficient to permit substantial distortion of said sealant strip under applied compressive forces.

The invention also includes a unitary
20 sealant and spacer strip adapted to provide sealing engagement between two spaced parallel members and to maintain said members a substantially fixed distance apart against the exertion of compressive
25 forces tending to move said members toward each other, said strip incorporating a desiccant and comprising an elongate body of a deformable sealant of substantially uniform cross section along its entire
30 length and having opposed surfaces which are substantially flat and substantially parallel one to another, spacer means enveloped by and embedded in said sealant and extending longitudinally the entire length
35 of the elongate body thereof, said unitary spacer means having sufficient strength in at least one direction normal to its longitudinal axis to resist the compressive forces tending to move said members toward each
40 other, the thickness to which said enveloping sealant extends beyond said spacer means in at least said one direction being sufficient for maintaining a continuous seal between said spacer means and said spaced
45 members while permitting only minimal distortion of the cross section of said elongate body of sealant.

The invention also includes a composite structure comprising first and second members having facing, generally parallel surfaces spaced a substantially predetermined distance from each other, and means for maintaining said members in spaced relationship and for effecting a seal between
55 said facing surfaces, said means incorporating a desiccant and comprising an elongated body of a deformable sealant and spacer means enveloped by and embedded in said sealant and extending longitudinally
60 the entire length of said elongated body, said means being disposed within and bridging the space between said first and second members with said deformable sealant in engagement with said facing surface,
65 said spacer means being in pressure con-

tact with said facing surfaces and having sufficient strength at least in one direction normal to said surfaces to maintain said first and second members said finite distance from each other.

The invention also includes a composite structure comprising first and second glass members having facing, generally parallel surfaces spaced a substantially predetermined distance from each other and unitary means located around, and in sealing contact with, the peripheries of said surfaces for maintaining said glass members in spaced relationship and for effecting a seal
75 in the space between said glass members, said unitary means comprising elongate, deformable, continuous sealant means and substantially continuous, rigid spacer means embedded in said sealant means and
85 extending longitudinally substantially the entire length of said sealant means around the peripheries of said surfaces, said unitary means being disposed within and bridging the space between said first and
90 second glass members with said sealant means being of a substantially common cross sectional configuration throughout its length and having substantially flat, substantially parallel, opposed surfaces in sealing engagement with said facing surfaces,
95 said unitary means having sufficient strength in the direction normal to said facing surfaces to maintain said first and second members at a said substantially predetermined distance from each other with
100 said spacer means out of contact with said first and second glass members and further including a desiccant within the matrix of the sealant means facing the space between said glass members.
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In order that the invention may be well understood, some embodiments thereof, which are given by way of example only, will now be described with reference to the
110 accompanying drawings, in which:

Figure 1 is a fragmentary perspective view, with parts in section, showing a first embodiment of the present invention;

Figure 2 is a fragmentary perspective view, with parts in section, showing a second embodiment of the present invention;

Figure 3 is a fragmentary perspective view, with parts in section, showing a third embodiment of the present invention; and

120 *Figure 4* is a fragmentary perspective view, with parts in section, showing a fourth embodiment of the present invention.

Referring now to the drawings, it will be
125 seen that Fig. 1 illustrates a composite structure comprising first member 10 and second member 12 having facing, generally parallel surfaces, spaced a finite distance from each other, and means for maintaining
130 ing members 10, 12 in spaced relationship

and for effecting a seal between the facing surfaces thereof, comprising a sealant and spacer strip designated generally as 14.

Members 10, 12 as illustrated are formed of glass. However, it will be appreciated that the invention has applicability in the environment of an unrestricted variety of construction or structural materials, including without limitation cement, concrete, brick, stone, metals, plastics and wood.

As further illustrated in Fig. 1 sealant and spacer strip 14 is a unitary strip and comprises an elongate ribbon 16 of deformable sealant, enveloping and having embedded therein spacer means 18 extending longitudinally the entire length of the ribbon 16. The ribbon 16 is of substantially common cross-sectional configuration along its entire length and has substantially flat, substantially parallel opposed surfaces.

In the embodiment illustrated, spacer means 18 takes the form of an undulating sheet of rigid material which may conveniently be formed of aluminium. It will be noted that all of the surfaces and edges of spacer means 18 are enveloped by and in intimate contact with ribbon 16 along the entire length of the ribbon 16 and spacer means 18.

Due to the geometry of spacer means 18 as illustrated in Fig. 1, it is capable of resisting compressive forces exerted on it in a plane which is normal to a plane in which the longitudinal axis of spacer means 18 lies, and which plane is coincident with a plane which is normal to the planes in which members 10, 12 lie. Thus, spacer means 18 is capable of resisting compressive forces tending to reduce the spacing between members 10, 12, and is thereby capable of maintaining members 10, 12 at a substantially predetermined distance from each other.

It will be apparent that if sealant and spacer strip 14 was rotated 90° about its own longitudinal axis, the orientation of spacer means 18 would be such that it would not be expected to be capable of resisting any substantial compressive forces exerted upon it in a direction normal to the surfaces of members 10, 12. The accordion folds would be expected to collapse. In view of this, it will be apparent that the particular embodiment of sealant and spacer strip illustrated in Fig. 1 requires attention to proper orientation for the strip to be effective as a spacer.

It has been found in practice that the orientation of spacer means 18, even though completely embedded within ribbon 16, is discernable upon visual inspection, since the enveloping sealant to a slight extent tends to follow the undulations of spacer means 18.

Nevertheless, to simplify the matter of

orientation, and for another reason explained below, it is contemplated that the surface of sealant and spacer strip 14 which is intended to lie in a plane normal to the surfaces of members 10, 12, be provided with an identifying indicia. Thus, all a fabricator need do is observe that the surface of sealant and spacer strip 14 which bears the indicia, be positioned perpendicularly to a surface of members 10, 12. This will insure that the sealant and spacer strip is correctly oriented.

Where the strip 14 is applied to the fabrication of multiple panel structures of transparent material, such as glass or plastic, the interior vertical surface of sealant and spacer strip 14 is visible in the completed unit. In many commercial assemblies, this surface has a finished look since it corresponds to the bottom outside surface of a permanently installed metal spacer member. Where it is desired to provide an aesthetically pleasing corresponding surface on the sealant and spacer strip the previously described indicia may serve this dual function. Thus, the interior, vertical surface of sealant and spacer strip 14 may be provided with decorative facing 20 which may be adhesively or cohesively applied, or coextruded with sealant and spacer strip 14.

When facing 20 is positioned perpendicularly to the surfaces of members 10, 12 and interiorly of their peripheral edges, it functions both as a means for orienting spacer means 18, and as a means providing the exposed interior, vertical surface of sealant and spacer strip 14 with an aesthetically pleasing, decorative facing.

An additional advantage of the configuration of spacer means 18 illustrated in Fig. 1, is that it permits sealant and spacer strip 14 to be bent readily around corners. This capability is particularly desirable where the sealant and spacer strip is employed in the fabrication of multiple panel units which acts as a thermal insulating barrier, e.g., double glazed thermal insulating windows. In such units the air space between the two panel member is sealed from the atmosphere. The fewer joints which are employed in establishing the seal, the less is the risk of failure of the seal, which failure is most likely to take place at a joint. Since sealant and spacer strip 14 can be bent around corners, a peripheral seal can be effected with only one joint.

As previously noted elongated ribbon 16 of deformable sealant envelopes and completely embeds spacer means 18. The thickness to which elongated ribbon 16 extends beyond the surfaces and edges of means 18 is not critical as an absolute measurement, but is important in terms of functional considerations. Thus, the thickness of the

enveloping sealant extending beyond spacer means 18, at least in the plane subjected to compressive forces, must be sufficient to maintain a continuous sealing interface under the applied compressive forces, but insufficient to permit substantial distortion of the sealant and spacer strip under such applied forces. There must be enough sealant to effect a seal, but not so much as to cause a disfiguring amount of "ballooning" of the sealant in the area bridging the surfaces of the two panel members.

For most applications, where the surfaces of the two members being sealed are relatively smooth, the thickness of the enveloping sealant extending beyond the spacer means should be on the order of 1/8". This has been found to be sufficient to provide a seal, without producing excessive ballooning.

Because the surfaces of tempered glass may not be as flat as the surfaces of untempered glass, somewhat greater thicknesses may be required to provide tempered glass with an adequate seal. Where the surfaces of the two members being sealed are rough, as for example, in the case of concrete, thicknesses as high as a 1/4" or more may be needed to effect a seal.

As previously noted, spacer means 18 may be formed of aluminum. It may however be formed of alternative materials, including suitably treated paper, such as waterproofed kraft paper, plastic, and of course metals other than aluminum. Depending upon the material used and the configuration of the spacer means, a wide variety of fabrication methods may be employed, including extrusion, stamping, bending, and casting to name a few of the more common fabrication procedures.

The elongated ribbon of sealant has heretofore been described as "deformable", and this requires a word of explanation. The term "deformable" as used herein is intended to characterize a sealant, whether thermoplastic, thermosetting, or thermoplastic-thermosetting, which when used in the fabrication of composite structures contemplated by this invention, is at least initially incapable of resisting the compressive forces exerted upon it.

Thus, the term "deformable" is intended to characterize a material which in an uncured state is incapable of resisting compressive forces exerted upon it, even though upon curing it is capable of resisting such forces. Further, the term "deformable" is intended to characterize a sealant which is initially incapable of resisting the compressive forces exerted upon it, and remains so throughout its useful life.

It will become apparent from the foregoing

explanation that the spacer means embedded in a deformable sealant may serve only the temporary function of maintaining the spacing between two members, until

such time as the deformable sealant is cured to where the sealant itself is capable of resisting the compressive forces exerted upon the sealant and spacer strip. It will also be appreciated that the spacer means

may function permanently as the sole means for maintaining proper spacing between two members, as in the case where the deformable sealant, being a true thermoplastic material, never becomes capable

of resisting the compressive forces exerted upon it, at or above temperature at which it flows.

It will therefore be understood that a wide variety of materials may be used as the deformable sealant, including polysulfide polymers, urethane polymers, acrylic polymers, and the styrene-butadiene polymers. Included among the latter are a class of thermoplastic resins which when below their flow temperature, exhibit elastic properties of vulcanized polymers. Such resins are sold by Shell Chemical Co. under the trademark Kraton.

The strip 14 incorporates a desiccant which is particularly desirable in the fabrication of multiple glazed, transparent thermal insulating units formed of glass or plastic for the reason described above. Conveniently, the desiccant can be incorporated within the deformable sealant matrix, within the spacer means or within the facing material. A particularly suitable class of materials for this purpose is synthetically produced crystalline zeolites sold by Union Carbide Corporation under the name Linde Molecular Sieves. Another desiccant which may be used is silica gel. Combinations of different desiccants are also contemplated.

The preferred method of manufacturing the sealant and spacer strip is by coextrusion. This can be accomplished with commercially available coextruding equipment which in some instances may require minor modification. In general, a previously

formed or just formed spacer means, is fed through the center of an extrusion die, and the deformable sealant is extruded around the spacer means. The composite material is then fed through a sizing die to obtain a sealant and spacer strip having the desired outside dimensions and the proper thickness of enveloping sealant extending beyond the spacer means. These coextrusion techniques are well known to those having ordinary skill in the art.

The provision of an orienting and/or decorative facing, if accomplished by coextrusion, may be achieved by the provision of a second coextrusion die which either precedes or follows the sizing die. In the

latter event, a second sizing die may be employed beneficially. Alternatively, the orienting and/or decorative facing may be applied adhesively or cohesively as a separate laminating process after the coextrusion of sealant and spacer means has been sized. The settings on the sizing dies will of course have to take into consideration the fact that the additions of the orienting and/or decorative facing will increase the overall dimensions of the sealant and spacer strip.

Fig. 2 shows a second embodiment of the invention wherein a composite structure comprises first and second members 22, 24 having facing, generally parallel surfaces spaced a predetermined distance from each other, and a unitary sealant and spacer strip, designated generally as 26, maintaining members 22, 24 in spaced relationship and for effecting a seal between the facing surfaces thereof.

Like strip 14 sealant and spacer strip 26 incorporate a desiccant and comprises an elongate body 28 of deformable sealant, and spacer means 30, enveloped by and embedded in the sealant and extending longitudinally the entire length of elongate body 28.

In the embodiment illustrated in Fig. 2, spacer means 30 takes the form of a strip of material undulated to provide a continuous array of complementary triangular shapes. This configuration, when compared with the spacer means in Fig. 1 provides considerably more convoluted edge per unit length of spacer means. It will be readily apparent therefore that, if the strength and thickness of the spacer means materials are equal, the embodiment in Fig. 2 will support higher compressive forces than will the embodiment in Fig. 1. However, as was the case with the Fig. 1 embodiment, the arrangement shown in Fig. 2 can be bent around corners, making this embodiment of sealant and spacer strip attractive for use where hemetic seals are needed.

Fig. 3 illustrates a composite structure comprising first and second members 32, 34 having facing, generally parallel surfaces spaced a predetermined distance from each other, and means for maintaining members 32, 34 in spaced relationship and for effecting a seal between the facing surfaces thereof in the form of lengths of a unitary sealant and spacer strip, designated generally as 36. The sealant and spacer strip 36 incorporates a desiccant and comprises an elongate body 38 of deformable sealant, and spacer means 40 enveloped by and embedded in the sealant and extending the entire length of the elongate body 38 in each length of strip 36.

In the embodiment illustrated in Fig. 3, spacer means 40 has a generally X configu-

ration, from which it will be apparent that it has the capability of resisting compressive forces without regard to the orientation of the spacer means about its longitudinal axis. Thus, this configuration obviates the need for the exercise of particular care in orienting the sealant and spacer strip, as well as the need for any orienting indicia. It may however be desirable to incorporate a decorative facing on one surface of the strip to satisfy aesthetic requirements.

The configuration illustrated in Fig. 3 does not lend itself to being bent around corners, and thus requires the use of butt joints, between the lengths of strip 36, one joint of which is illustrated in the Fig. 3. Thus, in the embodiment of Fig. 3 the spacer means 40 extends the entire length of the sealant save for the discontinuities at the butt joints.

Turning to Fig. 4, there will be seen illustrated a composite structure comprising first and second members 42, 44 having facing, generally parallel surfaces spaced a finite distance from each other, and means for maintaining members 42, 44 in spaced relationship and for effecting a seal between the facing surfaces thereof, which means in the embodiment illustrated in Fig. 4 takes the form of lengths of a unitary sealant and spacer strip designated generally as 46.

The sealant and spacer strip 46 incorporates a desiccant and comprises an elongate body 48 of deformable sealant and spacer means 50 enveloped by and embedded in the sealant, and extending longitudinally the entire length of the elongate body 48 in each length of strip 46.

Spacer means 50 has an open box structure, which does not require special orientation as do the embodiments illustrated in Figs. 1 and 2. Further, due to the comparatively massive structure of spacer means 50, it would be expected to be capable of supporting compressive loads far in excess of those supportable, for example, by the corresponding spacer means illustrated in Fig. 1.

As with the embodiment illustrated in Fig. 3, spacer means 50 does not lend itself to being bent around corners, and thus it can be employed most advantageously where butt joints are acceptable.

It will be appreciated that in each of the illustrated embodiments unitary means are located around, and in sealing contact with, the peripheries of facing, generally parallel surfaces of first and second glass members for maintaining the surfaces spaced apart by a substantially predetermined distance and for effecting a seal between the glass members. Further, in each embodiment illustrated herein, the unitary means com-

prises elongate, deformable, continuous sealant means and substantially continuous, rigid spacer means embedded in the sealant means and extending longitudinally substantially the entire length of the sealant means around the peripheries of the surfaces of the glass members. The unitary means are disposed within and bridge the space between the first and second glass members with the sealant means being of a substantially common cross-sectional configuration throughout its length and having substantially flat, substantially parallel, opposed surfaces in sealing engagement with the facing surfaces of the glass members.

CLAIMS

1. A unitary sealant and spacer strip incorporating a desiccant and comprising an elongate ribbon of a deformable sealant enveloping and having embedded therein a unitary spacer means extending longitudinally the entire length of said ribbon of sealant, said sealant being of a substantially common cross sectional configuration along its entire length and having substantially flat, substantially parallel, opposed surfaces, said spacer means having surfaces and edges all of which are enveloped by and in intimate contact with said sealant along the entire length of said spacer means and said sealant, said spacer means being capable of resisting compressive forces exerted in the plane normal to the substantially flat, substantially parallel opposed surfaces of said sealant, the thickness of said enveloping sealant extending beyond said spacer means in at least said plane, and being sufficient to maintain a continuous sealing interface under applied compressive forces, but insufficient to permit substantial distortion of said sealant strip under applied compressive forces.

2. A sealant and spacer strip as claimed in claim 1, wherein said spacer means comprises an undulating sheet material.

3. A sealant and spacer strip as claimed in claim 1, wherein said spacer means comprises a sheet of aluminium having accordion folds.

4. A sealant and spacer strip as claimed in claim 1, wherein said spacer means has an X cross section.

5. A sealant and spacer strip as claimed in claim 1, wherein said spacer means has a generally rectilinear cross section.

6. A sealant and spacer strip as defined in any one of the preceding claims having a generally rectilinear cross section, and a facing on one longitudinally extending surface of said elongated ribbon of sealant distinguishing that surface from the remaining longitudinally extending surfaces thereof.

7. A sealant and spacer strip as claimed

in claim 6, wherein said facing is disposed in a plane parallel to said at least one plane.

8. A unitary sealant and spacer strip adapted to provide sealing engagement between two spaced parallel members and to maintain said members a substantially fixed distance apart against the exertion of compressive forces tending to move said members toward each other, said strip incorporating a desiccant and comprising an elongate body of a deformable sealant of substantially uniform cross section along its entire length and having opposed surfaces which are substantially flat and substantially parallel one to another, spacer means enveloped by and embedded in said sealant and extending longitudinally the entire length of the elongate body thereof, said unitary spacer means having sufficient strength in at least one direction normal to its longitudinal axis to resist the compressive forces tending to move said members toward each other, the thickness to which said enveloping sealant extends beyond said spacer means in at least said one direction being sufficient for maintaining a continuous seal between said spacer means and said spaced members while permitting only minimal distortion of the cross section of said elongate body of sealant.

9. A sealant and spacer strip as claimed in claim 8, wherein said spacer means comprises an undulating sheet having upper and lower edges aligned in planes parallel to the longitudinal axis of said spacer means.

10. A composite structure comprising first and second members having facing, generally parallel surfaces spaced a substantially predetermined distance from each other, and means for maintaining said members in spaced relationship and for effecting a seal between said facing surfaces, said means incorporating a desiccant and comprising an elongate body of a deformable sealant and spacer means enveloped by and embedded in said sealant and extending longitudinally the entire length of said elongated body, said means being disposed within and bridging the space between said first and second members with said deformable sealant in engagement with said facing surfaces, said spacer means being in pressure contact with said facing surfaces and having sufficient strength at least in one direction normal to said surfaces to maintain said first and second members said finite distance from each other.

11. A composite structure as claimed in claim 10, wherein said first and second members are transparent.

12. A composite structure as claimed in claim 10, wherein said first and second



prises elongate, deformable, continuous sealant means and substantially continuous, rigid spacer means embedded in the sealant means and extending longitudinally substantially the entire length of the sealant means around the peripheries of the surfaces of the glass members. The unitary means are disposed within and bridge the space between the first and second glass members with the sealant means being of a substantially common cross-sectional configuration throughout its length and having substantially flat, substantially parallel, opposed surfaces in sealing engagement with the facing surfaces of the glass members.

CLAIMS

1. A unitary sealant and spacer strip incorporating a desiccant and comprising an elongate ribbon of a deformable sealant enveloping and having embedded therein a unitary spacer means extending longitudinally the entire length of said ribbon of sealant, said sealant being of a substantially common cross sectional configuration along its entire length and having substantially flat, substantially parallel, opposed surfaces, said spacer means having surfaces and edges all of which are enveloped by and in intimate contact with said sealant along the entire length of said spacer means and said sealant, said spacer means being capable of resisting compressive forces exerted in the plane normal to the substantially flat, substantially parallel opposed surfaces of said sealant, the thickness of said enveloping sealant extending beyond said spacer means in at least said plane, and being sufficient to maintain a continuous sealing interface under applied compressive forces, but insufficient to permit substantial distortion of said sealant strip under applied compressive forces.

2. A sealant and spacer strip as claimed in claim 1, wherein said spacer means comprises an undulating sheet material.

3. A sealant and spacer strip as claimed in claim 1, wherein said spacer means comprises a sheet of aluminium having accordion folds.

4. A sealant and spacer strip as claimed in claim 1, wherein said spacer means has an X cross section.

5. A sealant and spacer strip as claimed in claim 1, wherein said spacer means has a generally rectilinear cross section.

6. A sealant and spacer strip as defined in any one of the preceding claims having a generally rectilinear cross section, and a facing on one longitudinally extending surface of said elongated ribbon of sealant distinguishing that surface from the remaining longitudinally extending surfaces thereof.

7. A sealant and spacer strip as claimed

in claim 6, wherein said facing is disposed in a plane parallel to said at least one plane.

8. A unitary sealant and spacer strip adapted to provide sealing engagement between two spaced parallel members and to maintain said members a substantially fixed distance apart against the exertion of compressive forces tending to move said members toward each other, said strip incorporating a desiccant and comprising an elongate body of a deformable sealant of substantially uniform cross section along its entire length and having opposed surfaces which are substantially flat and substantially parallel one to another, spacer means enveloped by and embedded in said sealant and extending longitudinally the entire length of the elongate body thereof, said unitary spacer means having sufficient strength in at least one direction normal to its longitudinal axis to resist the compressive forces tending to move said members toward each other, the thickness to which said enveloping sealant extends beyond said spacer means in at least said one direction being sufficient for maintaining a continuous seal between said spacer means and said spaced members while permitting only minimal distortion of the cross section of said elongate body of sealant.

9. A sealant and spacer strip as claimed in claim 8, wherein said spacer means comprises an undulating sheet having upper and lower edges aligned in planes parallel to the longitudinal axis of said spacer means.

10. A composite structure comprising first and second members having facing, generally parallel surfaces spaced a substantially predetermined distance from each other, and means for maintaining said members in spaced relationship and for effecting a seal between said facing surfaces, said means incorporating a desiccant and comprising an elongate body of a deformable sealant and spacer means enveloped by and embedded in said sealant and extending longitudinally the entire length of said elongated body, said means being disposed within and bridging the space between said first and second members with said deformable sealant in engagement with said facing surfaces, said spacer means being in pressure contact with said facing surfaces and having sufficient strength at least in one direction normal to said surfaces to maintain said first and second members said finite distance from each other.

11. A composite structure as claimed in claim 10, wherein said first and second members are transparent.

12. A composite structure as claimed in claim 10, wherein said first and second



members are sheets of glass.

13. A composite structure as claimed in claim 12, wherein said deformable sealant constitutes a continuous, peripheral, hermetic seal, providing a thermal insulating air pocket between said sheets of glass and interiorly of said peripheral, hermetic seal.

14. A composite structure as claimed in any one of the preceding claims, wherein said desiccant is incorporated within the matrix of said sealant.

15. A composite structure comprising first and second glass members having facing, generally parallel surfaces spaced a substantially predetermined distance from each other and unitary means located around, and in sealing contact with, the peripheries of said surfaces for maintaining said glass members in spaced relationship and for effecting a seal in the space between said glass members, said unitary means comprising elongate, deformable, continuous sealant means and substantially continuous, rigid spacer means embedded in said sealant means and extending longitudinally substantially the entire length of said sealant means, around the peripheries of said surfaces said unitary means being disposed within and bridging the space between said first and second glass members with said sealant means of a substantially common cross sectional configuration throughout its length and having substantially flat, substantially parallel, opposed surfaces in sealing engagement with said facing surfaces, said unitary means having sufficient strength in the direction normal to said facing surfaces to maintain said first and second members at a said substantially predetermined distance from each other with said spacer means out of contact with said first and second glass members and further including a desiccant within the matrix of the sealant means facing the space between said glass members.

16. A composite structure as claimed in claim 15, wherein said spacer means is of an undulating shape.

17. A composite structure as claimed in claim 15 or 16, wherein said spacer means is made of an aluminium strip.

18. A unitary sealant and spacer strip substantially as herein described with reference to any one of Figs. 1 to 4 of the accompanying drawings.

19. A composite structure comprising first and second members having facing, generally parallel surfaces spaced a predetermined distance apart and substantially as herein described with reference to any one of Figs. 1 to 4 of the accompanying drawings.

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