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(54) Spacer for a double glazing

(57) A self-supporting hollow spacer tube (10) for a multiple glazed unit in which said hollow spacer tube (10) is to be fitted between at least two or three glazing panes (12) spaced apart to form a cavity and in which the body of the hollow spacer tube (10) comprises a thermoplastic material and is bonded to a gas-impermeable tape (14) facing away from said cavity **characterised in that** the body of the hollow spacer tube (10) comprises a composition of thermoplastic with fibres and the tape (14) comprises a polymeric material, preferably polyester, so that in use the tape (14) will resist gas leakage through the hollow spacer tube (10).

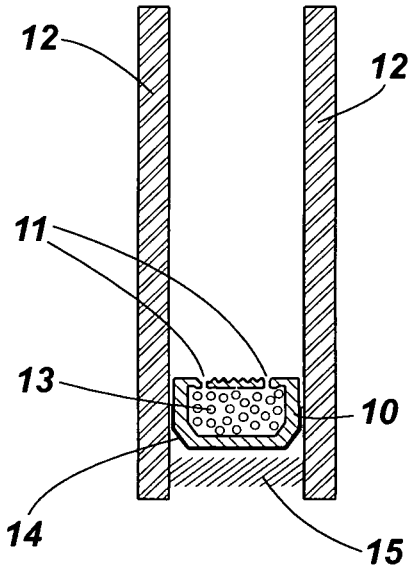

Fig. 3

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Description

[0001] This invention relates to a novel spacer tube for use in a sealed multiple glazed unit, particularly a double glazed unit.

[0002] Although the invention will be described in terms of a double glazed unit, it could also be used for multiple glazed units e.g. triple glazed units.

[0003] Known double glazed units typically consist of two glazing panes, usually of glass, which are sealed to and separated by a self-supporting spacer tube, usually of metal, around the outer edges of the glazing panes. The spacer tube is usually hollow and may be formed into any shape by bending and/or by joining (e.g. using corner keys) as is well known in the industry. It is then usually filled with desiccant and sandwiched and sealed between the two glazing panes to form a unit, defining a cavity (interspace) between the glazing panes. The sealing against the glazing panes may be by way of a sealant and/or adhesive e.g. butyl rubber, again as is known in the industry. In order to improve the heat insulation performance of the glazed unit, it is desirable although not essential to introduce an inert gas such as argon and/or xenon or similar gas into the cavity, in which case if the spacer tube is not constructed of 100% metal it is usual to have a composite hollow spacer tube with a gas barrier of metal tape (e.g. of steel or aluminium) around its outer edge i.e. facing away from the cavity (interspace). A disadvantage with these known units is that the use of metal as a gas barrier reduces the potential energy rating of the final double glazed unit, whether it be e.g. a window, door, structural glazing system or any other type insulated glass unit used in applications such as refrigeration, marine application, aviation or motor vehicles etc. The industry requires as high a final energy rating as possible, preferably a 'C' rating or above, as stated in Part L of the Building Regulations.

[0004] The aim of the present invention is to provide an improved hollow spacer tube for use in a sealed glazing unit without the Steel or Aluminium gas barrier for use in the application described above which will provide the possibility of achieving that high energy rating in the finished end product.

[0005] According to one aspect of the present invention there is provided a self-supporting hollow spacer tube for a multiple glazed unit in which said hollow spacer tube is to be fitted between at least two or three glazing panes spaced apart to form a cavity and in which the body of the hollow spacer tube comprises a thermoplastic material and is bonded to a gas-impermeable tape facing away from said cavity **characterised in that** the body of the hollow spacer tube comprises a composition of thermoplastic with fibres and the tape comprises a polymeric material, so that in use the tape will resist gas leakage through the hollow spacer tube.

[0006] Where the glazing unit is triple glazed, then there will usually be two spacer frames of hollow spacer tubes and two sealed cavities; the invention is equally applicable to such a construction and indeed to glazed units containing any number of glazing panes. In addition to the spacer tube, the unit may contain additional glazing bars e.g. Georgian bars.

[0007] The tape preferably comprises polyester, is water impermeable and of a thickness in the range 1 to 100 microns. Preferably the tube reduces the MVTR (Moisture vapour transmission rate) into the unit while preventing gas from escaping from the unit. In order for the tape to be held in position on the body of the hollow spacer tube, a hot melt adhesive or primer system may be used or the tape may have a self adhesive back, preferably only on the face which attaches to the spacer tube. The tape is applied in the form of a single continuous strip along the length of the hollow spacer tube. Preferably the tape is flexible longitudinally and laterally so that it can extend around the hollow spacer tube i.e. in at least three planes. Usually the tape will extend substantially around all the faces of the spacer tube except for the face adjacent the cavity.

[0008] The glazing panes are usually of glass but may e.g. be of Perspex plastic or other plastic material, or any other transparent, translucent or opaque material.

[0009] The thermoplastic material for the hollow spacer tube may be selected from polypropylene (The preferred choice), PVC, Nylon, Acrylonitrile butadiene styrene (ABS) and polystyrene foam (e.g. as available under the registered trade mark Styrofoam). The proportion of the fibres (which are preferably glass fibres) is preferably in the range from 5 to 50% by weight glass fibres, more preferably from 25 to 50% by weight glass fibres. The glass fibres within the hollow spacer tube are designed not to be aligned in any specific or one direction within the construction of the hollow spacer tube. The hollow spacer tube may be formed into a rectangle by extrusion, moulding, bending and/or by joining (e.g. using corner keys). It is usually provided with a dual line of breathing holes in the surface adjacent to the cavity, the purpose of which is to allow movement of warm air from the hollow tube into the airspace between the two or three panes of glass; this is a critical requirement when using hollow plastic based spacer tubes in conjunction with hot applied insulating glass sealants i.e. at 100 degrees C to 200 degrees C. This is unlike other systems with a single line of breather_holes which are designed primarily to be used in conjunction with cold applied sealants. The dual breather hole system allows for rapid escape of hot gas into the airspace between the two or three panes of glass, whereas single breather holes do not. The resultant use of single breather holes is that hot gas expands along the inside of the hollow tube (the holes are too small and not in enough numbers to allow the gas through them quick enough) as the hot secondary sealant is applied and out through the corner key joint through the secondary sealant creating a moisture ingress path or channel for gas to leak out of and into the atmosphere. The hollow spacer tube contains a molecular sieve for absorbing moisture in the cavity between the glazing panes; the

breather holes are designed to keep this within the hollow tube and still allow passage of moisture/gasses in and out of the internal surface of the hollow spacer tube. There are various ways of assembling a glazed unit to incorporate the present invention. For example, the hollow spacer tube may be assembled into a frame (e.g. by using four corner keys and four straight pieces) and the resulting frame is then sandwiched and joined between two or three glazing panes, inert gas is introduced into the resulting cavity by means of a drill hole provided through one of the straight sides of the hollow spacer tube. It is also possible to introduce gas through a corner key joint that can be pushed to fit and sometimes bonded to the hollow tube with an adhesive, this corner key joint can also be sealed with a foiled gas lock-strip creating a gas-tight frame similar to that of bended spacer systems.

[0010] It will be appreciated that certain features of the invention which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are for brevity described in the context of a single embodiment, may also be provided separately or in any suitable combination.

[0011] Embodiments of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a section view of a spacer tube according to one aspect of the present invention.

Figure 2 is a section view as in Figure 1 but showing more clearly the two rows of breather holes.

Figure 3 is a section view showing the assembly in a double glazed unit of the spacer tube shown in Figures 1 & 2.

Figure 4 is a section view showing the assembly in a triple glazed unit of the spacer tube shown in Figures 1 & 2.

[0012] Referring to Figures 1 to 3, the hollow spacer tube 10 of polypropylene with glass fibres dispersed randomly throughout is provided with two rows of breather holes 11 along the face of the tube which will be adjacent the cavity between glass panes 12. The tube contains a molecular sieve 13 and around each of its faces except for the face containing the breather holes 11 is affixed a thin gas impermeable barrier tape 14 of polyester. Excluding the face containing the breather holes 11, the tape 14 would extend about 75% around the other faces. The tube 10 is sealed between glass panes 12 by means of a sealant 15. Figure 4 has the same construction and components but in a triple glazed unit with three glass panes.

[0013] It will be understood that the section shown is through 1 piece of what would usually be 4 pieces of a frame. The dimensions shown refer to one of many standard frame sizes, selected according to the final application.

[0014] In use, the cavity between the glass panes 12 would be filled with inert gas. The polyester tape 14 being gas and water impermeable minimises acts to prevent water vapour passing into the cavity and gas from getting out. This prolongs the life of the glazed unit.

Claims

1. A self-supporting hollow spacer tube for a multiple glazed unit in which said hollow spacer tube is to be fitted between at least two or three glazing panes spaced apart to form a cavity and in which the body of the hollow spacer tube comprises a thermoplastic material and is bonded to a gas-impermeable tape facing away from said cavity **characterised in that** the body of the hollow spacer tube comprises a composition of thermoplastic with fibres and the tape comprises polymeric material, so that in use the tape will resist gas leakage through the hollow spacer tube.

2. A self-supporting hollow spacer tube according to claim 1 **characterised in that** the tape comprises polyester.

3. A self-supporting hollow spacer tube according to claim 1 or 2 **characterised in that** the tape is water impermeable.

4. A self-supporting hollow spacer tube according to any preceding claim **characterised in that** the tape is flexible longitudinally and laterally.

5. A self-supporting hollow spacer tube according to any preceding claim **characterised in that** the tape is water impermeable.

6. A self-supporting hollow spacer tube according to any preceding claim **characterised in that** the thickness of the tape is in the range 1 to 100 microns.

7. A self-supporting hollow spacer tube according to any preceding claim **characterised in that** the tape is bonded to the hollow spacer tube by means of a self adhesive back.

8. A self-supporting hollow spacer tube according to any preceding claim **characterised in that** the tape extends substantially around the hollow spacer tube except for the face of the hollow spacer tube adjacent the cavity.

9. A self-supporting hollow spacer tube according to any preceding claim **characterised in that** the hollow spacer tube comprises a thermoplastic polypropylene.

10. A self-supporting hollow spacer tube according to

any preceding claim **characterised in that** the fibres in the hollow spacer tube comprise glass fibres.

11. A self-supporting hollow spacer tube according to any preceding claim **characterised in that** the hollow spacer tube comprises fibres in the range 5 to 50% by weight.

12. A self-supporting hollow spacer tube according to any preceding claim **characterised in that** the hollow spacer tube comprises fibres in the range 25 to 50% by weight.

13. A self-supporting hollow spacer tube according to any preceding claim **characterised in that** the cavity contains inert gas.

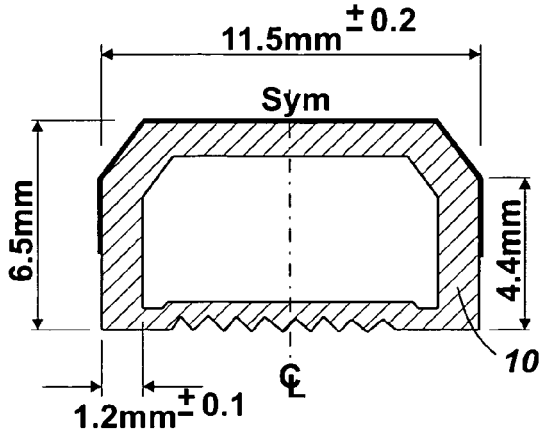

Fig. 1

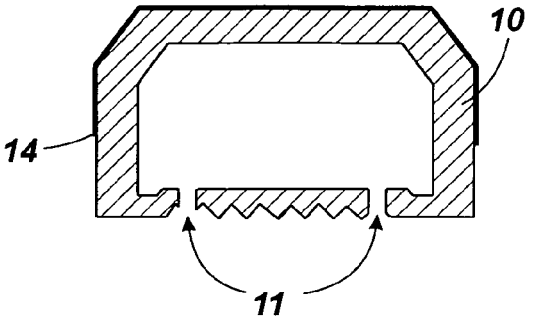

Fig. 2

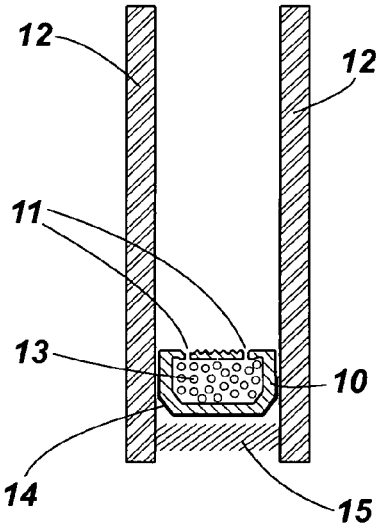

Fig. 3

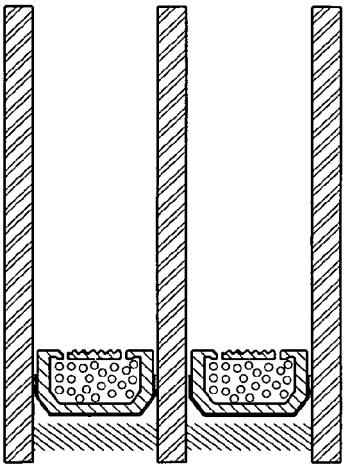

Fig. 4