

(19)



(11)

EP 2 729 635 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
05.08.2015 Bulletin 2015/32

(51) Int Cl.:
E04B 1/80 (2006.01) **E06B 3/663 (2006.01)**
E06B 7/02 (2006.01)

(21) Application number: **12714093.7**

(86) International application number:
PCT/SI2012/000005

(22) Date of filing: **03.02.2012**

(87) International publication number:
WO 2013/006144 (10.01.2013 Gazette 2013/02)

(54) MULTI CHAMBER GAS FILLED CONSTRUCTION PANEL

MIT EINEM GAS IN MEHREREN KAMMERN GEFÜLLTE BAUPLATTE

PANNEAU DE CONSTRUCTION REMPLI DE GAZ À CHAMBRES MULTIPLES

(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
Designated Extension States:
BA ME

(30) Priority: **04.07.2011 SI 201100244 P**

(43) Date of publication of application:
14.05.2014 Bulletin 2014/20

(73) Proprietors:
• **CBS Institut Celovite Gradbene Resitve, d.o.o.**
8210 Trebnje (SI)
• **Reflex, Gornja, Radgona, d.o.o.**
9250 Gornnja Radgona (SI)

(72) Inventors:
• **KRALJ, Ales**
1000 Ljubljana (SI)
• **HAJDINJAK, Rudy**
9250 Gornja Radgona (SI)

(74) Representative: **Marn, Jure**
Ljubljanska ulica 9
2000 Maribor (SI)

(56) References cited:
DE-A1- 19 732 733 **FR-A1- 2 741 377**
GB-A- 1 040 234 **US-A- 4 334 398**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 2 729 635 B1

Description

Field of Technology

[0001] This invention relates to technical solutions in the area of transparent or translucent heat insulation based on principle of multi chamber gas filled panel (GFP) which is used for general use, in particular in civil engineering, and even more in particular in prefabricated building envelopes - integrated façades.
ECLA: E04B1/80C, IPC: E06B3/663

Technical problem

[0002] Technical problem to be solved by this invention is problem due to significant buckling in or out of outer or inner covering panel during contraction or expansion (hereinafter both processes denoted as "dynamics") of insulation gas used in gas filled and optionally transparent or translucent building panels while at the same time addressing lack of sealing of insulation gas.

[0003] Problem to be solved is one of lack of air pressure equalization. During volumetric air expansion due to heat gain and/or loss present solutions do not have mechanism to compensate for heat contraction and expansion, and this may result in shape changing ("buckling").

State of the Art

[0004] With demise of fossil fuel availability, these fossil fuels having most comfortable mode of use our civilization is facing new ways of use of remaining energy sources. One of possible solutions is reduction of energy use for heating, cooling and erection of buildings. Thermal insulation of buildings is important in achieving reduction of energy use. Having need for effective thermal insulation corresponded to need for insulation systems with low thermal conductivity. These systems use composite panels which use (for their insulation core) also gas filled panels (GFP). Thick gas filled panels may result in buckling in or out of covering panels during extreme temperatures which may cause problems for mechanical or esthetic function of the panel.

[0005] State of the art features our own application WO2011031242 solving problem of dynamics of insulation gas in multi chamber gas filled panel by expansion air chamber, said chamber formed between panel and gas-tight foil which is positioned in concave position during manufacturing. Unfortunately gas-impermeable foils are usually metal and hence not translucent. Otherwise the problem of gas dynamics is solved by allowing of buckling of outer panels plates or by installation of plurality of small gas filled pockets (cushions) which are locally surrounded by air as air allows for dynamics of filled gas. The latter solution is not usable for translucent panels as thin polymer foils do not contain gases for prolonged time.

[0006] FR-A-2 741377 discloses panel formed by two panes of glass with a space between them. Air circulates in this space, drawn in from outside, heated and delivered to the interior of the building. Outlets at the bottom of the frame allow the air to pass into the room.

Detailed description of the invention

[0007] Multi chamber gas filled building panel solves above referenced technical problem by construction of building panel comprising essentially plan parallel inner (1) and outer (2) plates (fig. 1), these usually manufactured from tempered float glass.

[0008] Fig. 1 used for better depiction of the invention and forming part of this application shows inner plate (1), outer plate (2), insulation gas filled chamber (3), polymer foil (4), air filled chamber (5), opening (6), divider (7), spacer (8).

[0009] The plates preferably of glass (1) and (2) are usually approximately 6 to 8 mm thick monolithic or thicker while the glass is either etched glass or composite etched or fully transparent glass. For purposes of this application the composite glass refers to laminated safety glass, fire proof and/or insulation glass (IGU) or some other solution known in state of the art achieving same or similar purpose. Between the plates preferably of glass (1) and (2) there is at least one gas tight chamber (3) filled with insulation gas or insulation gas mixture, said adjacent chambers (in case of plurality thereof) divided between themselves using dividers (4) usually manufactured of transparent polymer foils or thin glass. These polymer foils may be commercially available polyester foils whereby the best results were achieved using foils around 0.1 mm in thickness, this in no way limiting this invention and used as an example only. The polymer foils or thin glass (4) may have one sided or both sided low emission coating. The building panel according to this invention in addition features at least one air filled chamber (5) which is connected to surrounding air via opening (6) or plurality thereof for air pressure equalization in order to enable inner volumetric expansion and contraction of insulation gas as shown on the fig.1. Air filled chamber has on one or both sides gas-impermeable divider (7). Said gas-impermeable divider (7) is usually comprised of a float glass preferably thick from 2 to 6 mm, more preferably around 4 mm thick, preferably tempered. Air and gas filled chambers are separated one from another and attached with spacers (8) which may be usual spacers from insulation glass technology. Gas-impermeable (7) may also have low emission coating. The gas-impermeable dividers (7) are in embodiment approximately 50% thinner than inner (1) or outer (2) plate in order to ensure expansion or contraction of gas filled chamber (5) due to expansion or contraction of insulation gas in chambers (3) according to Fig. 1. The plates (1) and (2) may therefore remain approximately flat during summer and winter which is purpose of this invention. Between the spacers, foils and glasses there are appropriate seal-

ants or adhesives, around whole panel there is sealing-adhesive mass which is in this embodiment polysulphide based. For adhesive or sealants one may use those known in manufacturing and assembly of insulation glasses or windows. Opening or plurality thereof (6) are also drilled through sealing-adhesive mass. Said opening or plurality thereof (6) may be additionally connected to surrounding air by means of appropriate tubes. The air filled chamber should have volume at least approximately 10% of total volume of gas filled chambers (3). The insulation gas in chambers (3) may be usual insulation gas or mixture used in insulation glass technology (IGU) such as Argon, Krypton, Carbon dioxide etc.

Preferred embodiment

[0010] The panel of dimensions height 2620 mm and width 1080 mm (fig. 1) is comprised with outer plate (2) of 8 mm tempered glass. Three foils (4) are HM88 of manufacturer Southwall Technologies. Five spacers (8) Chromatech Plus of stainless steel of nominal width 20 mm are manufactured by Rolltech. The divider (7) is comprised of 4 mm thick tempered float glass with low emission coating. Between spacers and dividers there is butyl sealing mass as customary used in insulation glasses and windows. On inner side there is a plate (1) which is composed of insulation glass with intermediate 16 mm spacers, 4 mm tempered glass turned toward panel interior and 8 mm tempered glass turned toward building interior. All glasses were manufactured by local manufacturer Reflex. Across the dividers and inner glasses there is 4 mm of standard polysulphide mass, said mass customary used in insulation glass or windows technology.

Claims

1. Multi chamber gas filled building panel comprising at least of essentially plan parallel plates such as outer (2) and inner (1) plates, of spacers between chambers (8), of at least one insulation gas filled chamber (3) said multi chamber gas filled building panel further comprised of at least one air filled chamber (5) said air filled chamber (5) on at least one side divided by gas-impermeable divider (7), and further that the air filled chamber (5) features at least one opening (6) **characterized in that** there are at least two adjacent insulation gas filled chambers (3) divided by a divider or plurality thereof (4) and whereby the opening or openings (6) allow for pressure equalization in order to enable inner volumetric expansion and contraction of the insulation gas.
2. The building panel according to claim 1 wherein the gas- impermeable divider (7) is comprised of float glass.

3. The building panel according to claim 1 wherein the outer (2) and inner (1) plates are comprised of standard float glass.
4. The building panel according to any of claims 2 or 3 wherein the gas- impermeable divider (7) has thickness lower than thickness of each of plates (1) and (2).
5. The building panel according to claim 1 wherein the gas- impermeable divider (7) is comprised of tempered float glass of thickness 2 mm to 6 mm preferably approximately 4 mm.
6. The building panel according to claim 3 wherein the outer (2) and inner (1) plates are comprised of glass with thickness at least 6 mm.
7. The building panel according to claim 1 wherein the openings (6) are holes drilled into the spacer (8).
8. The building panel according to claim 1 wherein said divider (4) or plurality thereof are comprised of transparent polymer.

Patentansprüche

1. Gasgefüllte Mehrkammer-Bauplatte, umfassend mindestens im Wesentlichen ebene parallele Platten wie Außenplatten (2) und Innenplatten (1), Abstandhalter zwischen den Kammern (8) mindestens eine mit Dämmgas gefüllte Kammer (3), wobei die gasgefüllte Mehrkammer-Bauplatte weiter mindestens eine mit Luft gefüllte Kammer (5) umfasst, die mit Luft gefüllte Kammer (5) auf mindestens einer Seite durch eine gasundurchlässige Trennvorrichtung (7) abgetrennt wird und ferner die mit Luft gefüllte Kammer (5) mindestens eine Öffnung (6) aufweist, **dadurch gekennzeichnet, dass** mindestens zwei angrenzende mit Dämmgas gefüllte Kammern (3) vorhanden sind, die durch eine Trennvorrichtung oder eine Vielzahl an diesen (4) abgetrennt sind und wobei die Öffnung oder Öffnungen (6) den Druckausgleich ermöglichen, um das innere volumetrische Ausdehnen und Zusammenziehen des Dämmgases zu ermöglichen.
2. Bauplatte nach Anspruch 1, wobei die gasundurchlässige Trennvorrichtung (7) Floatglas umfasst.
3. Bauplatte nach Anspruch 1, wobei die Außenplatte (2) und die Innenplatte (1) Standard-Floatglass umfassen.
4. Bauplatte nach einem der Ansprüche 2 oder 3, wobei die gasundurchlässige Trennvorrichtung (7) über eine Dicke verfügt, die kleiner ist als die Dicke jeder

der Platten (1) und (2).

5. Bauplatte nach Anspruch 1, wobei die gasundurchlässige Trennvorrichtung (7) gehärtetes Floatglas mit einer Dicke von 2 mm bis 6 mm, vorzugsweise ungefähr 4 mm, umfasst.
6. Bauplatte nach Anspruch 3, wobei die Außenplatte (2) und die Innenplatte (1) aus Glas mit einer Dicke von mindestens 6 mm umfassen.
7. Bauplatte nach Anspruch 1, wobei es sich bei den Öffnungen (6) um in den Abstandshalter (8) gebohrte Löcher handelt.
8. Bauplatte nach Anspruch 1, wobei der Abstandshalter (4) oder eine Vielzahl davon ein transparentes Polymer umfassen.

5

10

15

20

Revendications

1. Un panneau de construction multi-chambres rempli de gaz, composé au moins de plaques essentiellement parallèles à un plan, par exemple des plaques extérieures (2) et intérieures (1), d'entretoises entre les chambres (8), d'au moins une chambre d'isolation remplie de gaz (3), ledit panneau de construction multi-chambres rempli de gaz étant composé en outre d'au moins une chambre remplie d'air (5), ladite chambre remplie d'air (5) étant divisée sur au moins un côté par une cloison imperméable au gaz (7), et la chambre remplie d'air (5) comprenant au moins une ouverture (6) **caractérisée par le fait qu'il y a au moins deux chambres d'isolation remplies de gaz adjacentes (3) divisées par une cloison, ou une série de cloisons (4), et l'ouverture ou les ouvertures (6) permettant une égalisation de la pression afin de permettre une expansion volumétrique interne et une contraction du gaz d'isolation.**
2. Le panneau de construction selon la revendication 1, dans lequel la cloison imperméable au gaz (7) est composée de verre flotté.
3. Le panneau de construction selon la revendication 1, dans lequel les plaques extérieures (2) et intérieures (1) sont composées de verre flotté standard.
4. Le panneau de construction selon une quelconque des revendications 2 ou 3, dans lequel l'épaisseur de la cloison imperméable au gaz (7) est inférieure à celle de chacune des plaques (1) et (2).
5. Le panneau de construction selon la revendication 1, dans lequel la cloison imperméable au gaz (7) est composée de verre flotté trempé de 2 mm à 6 mm d'épaisseur, et de préférence de 4 mm d'épaisseur.

25

30

35

40

45

50

55

6. Le panneau de construction selon la revendication 3, dans lequel les plaques extérieures (2) et intérieures (1) sont composées de verre de 6 mm d'épaisseur minimum.

7. Le panneau de construction selon la revendication 1, dans lequel les ouvertures (6) sont des trous percés dans l'entretoise (8).

8. Le panneau de construction selon la revendication 1, dans lequel ladite cloison (4), ou une série de celles-ci, sont composées de polymère transparent.

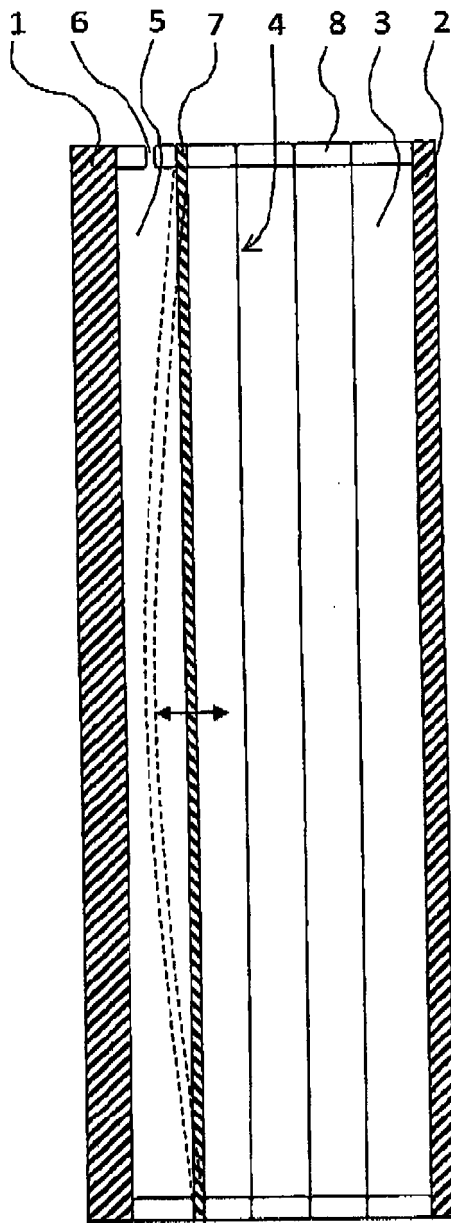


Fig. 1

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

- WO 2011031242 A [0005]
- FR 2741377 A [0006]