COMPOSITE PANEL AND METHOD FOR MANUFACTURING THE SAME

TECHNICAL FIELD

[0001] The present invention relates to composite panel and a method for manufacturing the same.

BACKGROUND

[0002] The following discussion of the background is intended to facilitate an understanding of the present disclosure only. It should be appreciated that the discussion is not an acknowledgement or admission that any of the material referred to was published, known or is part of the common general knowledge of the person skilled in the art in any jurisdiction as of the priority date of the invention.

[0003] Acoustic doors are widely used in various industries. Such doors act as a sound barrier, to reduce noise levels entering and leaving an environment or workspace. Various acoustical door systems have been contemplated. Such acoustical doors usually carry a sound transmission class (STC) rating, which is a measure of the sound insulation of the acoustical door.

[0004] A simple form of acoustical door system comprises a two-door panel system with an air barrier formed in-between opposing ends of each door panel. However, such an acoustical door system comprises hollow sections and may not be suitable for heavy industrial applications.

[0005] Current acoustical doors may include one or more composite panels shaped, dimensioned and/or sized to accommodate the applications for the doors. The composite panels may be layered, each layer include different materials.

[0006] The transmission of sound through a barrier is frequently rated as Sound Transmission Coefficient (STC). The higher the STC rating, the better is the sound deadening performance. For example, an STC rating of 50 -60 is deemed excellent for most structural needs. It is thus an objective of the invention to provide an acoustic door system which can be certified to obtain an STC rating of at least 60.

[0007] The STC rating of present acoustical doors seldom exceed 55. To improve STC rating, additional layers of materials are typically added to the composite panels without due regard to the weight and size of the acoustical door.

[0008] There exists a need for an improved composite panel to alleviate one or more of the aforementioned problems.

SUMMARY

[0009] The disclosure was conceptualised to provide one or more composite panels for forming an acoustical door with improved sound proofing characteristics. The one or more composite panels may be especially suited to be implemented as acoustical panels, such as acoustical door panels or acoustical window panels.

[0010] In an aspect there is a composite panel comprising a first section and a second section separated by a sandwich section, wherein the sandwich section comprises at least one interfacing region to facilitate coupling between the first section and the second section, and the at least one interfacing region comprises an elastomeric medium. Such an arrangement provides for vibration isolation and is particularity suited for applications in acoustical door systems.

[0011] In some embodiments, the elastomeric medium comprises rubber.

[0012] In some embodiments, the sandwich section comprises four interfacing regions.

[0013] In some embodiments, the four interfacing region may be arranged such as to comprise an outer pair of interfacing regions and an inner pair of interfacing regions.

[0014] In some embodiments, each interfacing region comprises metallic plates, such as steel plates or stainless steel plates disposed around the periphery of the composite panel.

[0015] In some embodiments, the metallic plates may be shaped and dimensioned to receive fasteners for securing the first section with the second section of the door panel.

[0016] In some embodiments, the elastomeric medium is suitably positioned between the metallic plates and the fasteners.

[0017] In some embodiments, the first section and the second section each comprises at least one layer of silicate-based material and at least one layer of a gypsum based material.

[0018] In some embodiments, the silicate-based material includes at least one of a fibre silicate board, a calcium silicate board and a magnesium silicate board.

[0019] In some embodiments, the silicate-based material is a high-density silicate board.

[0020] In some embodiments, the silicate-based material has a thickness of six (6) millimetres.

[0021] In some embodiments, the first section comprises at least one structural reinforcement section.

[0022] In some embodiments, the structural reinforcement section is disposed proximate an end of the composite panel.

[0023] In some embodiments, the first section comprises two reinforcement sections disposed at opposing ends of the composite panels.

[0024] In some embodiments, the reinforcement section(s) are filled with gypsum based material.

[0025] In some embodiments, the gypsum based material includes one or more gypsum boards.

[0026] In some embodiments, the composite panel comprises a steel perimeter.

[0027] In some embodiments, the elastomeric material is in the form of rubber gaskets, each gasket having a tensile strength of around 75 kilograms per cubic centimetres (kg/cm^3). Each rubber gasket may further have a specific gravity of 1.34 ±0.05, and/or a Shore A hardness rating of 55 ±5.

[0028] According to another aspect of the disclosure, there is an acoustical door system comprises at least one composite panel forming at least one door panel, the composite panel comprising a first section and a second section separated by a sandwich section, wherein the sandwich section comprises at least one interfacing region to facilitate coupling between the first section and the second section, and the at least one interfacing region comprises an elastomeric medium.

[0029] In some embodiments, the acoustical door system comprises two composite panels forming a corresponding two-door leaf configuration.

[0030] In some embodiments, the acoustical door system further comprises a door frame, wherein the two composite panels is coupled to the door frame assembly.

[0031] In some embodiments, the door frame assembly comprises a polymer filled sheet. The polymer filled sheet may be a bitumen-based polymer.

[0032] According to another aspect of the disclosure thee is a method of manufacturing a composite panel comprising the steps of providing a first section and a second section; providing a sandwich section, the sandwich section comprises at least one interfacing region and the at least one interfacing region comprises an elastomeric medium; and coupling via the sandwich section the first section and the second section.

[0033] In some embodiments, the first section may be formed comprising the steps of: attaching, using a first sealant, a first layer of plasterboard to a perimeter of the composite panel; attaching, using a second sealant, a second layer of plasterboard to the first layer of plasterboard; and attaching, using the second sealant, a third layer of plasterboard to the second layer of board.

[0034] In some embodiments, the first sealant includes a contact sealant or a fire rated intumescent sealant.

[0035] In some embodiments, the second sealant includes a fire rated intumescent polyurethane sealant.

[0036] Other aspects and features of the present invention will become apparent to those of ordinary skill in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

Brief Description of the Drawings

[0037] In the figures, which illustrate, by way of example only, embodiments of the present disclosure,

[0038] Figure 1 is an elevation (front) view of a door assembly mounted on a surface in accordance with some embodiments;

[0039] Figure 2 is a sectional view A-A of Fig.1, showing the interface detail between the a door panel and the top and bottom frames;

[0040] Figure. 3 is a sectional view B-B of Fig.1, showing the interface detail between the two door panels and the left and right frames;

[0041] Figure. 4 is a sectional view of an inactive door panel with emphasis on a sandwich section separating a first section and a second section of the inactive door panel;

[0042] Figure. 5 is a sectional view of an active door panel with emphasis on a sandwich section separating a first section and a second section of the active door panel;

[0043] Figure 6 is a sectional view of an exemplary door panel with infill details.

DESCRIPTION OF EMBODIMENTS

[0044] The disclosure was conceptualized to provide one or more composite panels. The one or more composite panels can be used to form at least one door panel as part of an acoustical door system with improved sound proofing characteristics.

[0045] In order to illustrate the technical solution(s) to the embodiments of the present disclosure, embodiments of the present disclosure are described with reference to the drawings. It is appreciable that the drawings referred to are some examples or embodiments of the present disclosure. A person having ordinary skill in the art, without further creative efforts, may apply the present disclosure to other scenarios according to these drawings. For example, although the drawings relate to a two-door embodiment, a person having ordinary skill in the art and without creative efforts would be able to apply the present disclosure to a single-door embodiment.

[0046] Embodiments of the present disclosure may be applied to different types of doors or other similar access points, including but are not limited to doors, hatch doors, doors with windows, windows, single leaf doors and multiple leaf doors. While the present disclosure discloses a sealing assembly for a door, those having ordinary skill in the art, without further creative efforts may apply these disclosures to doors, hatch doors, doors with windows, windows, single leaf doors, and multiple leaf doors.

[0047] In an aspect, there is a composite panel comprising a first section and a second section separated by a sandwich section, wherein the sandwich section comprises at least one elastomeric medium. Such an arrangement provides for a certain level of vibration isolation. In a 2-door leaf acoustic door system, one or both of the door panels may include the composite panel.

[0048] Figure 1 illustrates the application of the composite panel as part of an acoustical door system or assembly 10. The door system 10 comprises two door panels 18 and 19. Each of the door panel 18, 19 includes the composite panel. The door system 10 is suited, but not limited to, heavy duty industrial application such as in tunnels, such as railway tunnels or expressway tunnels. It is appreciable that the door assembly 10 shown in Figure 1 is in a closed state or configuration.

[0049] Figure 1 is an elevation view (front view) of the complete door assembly mounted on a surface, such as a vertical wall 12. The door assembly 10 comprises a frame assembly 11, which is mounted to the vertical wall 12 and floor 13. The frame assembly 11 comprises a top frame 14, a pair of side frames 15, 16 and the

bottom frame 17. The frame assembly 11 may be welded to the wall 12. The side frame 15 may be a left-side frame and the side frame 16 a right-side frame. The bottom frame 17 may include a bottom threshold frame member.

[0050] The door panels 18, 19 are configured to swing with respect to the frame assembly 11, facilitated by mounting devices such as one or more hinges 21. Such hinges 21 may suitably be heavy-duty hinges. The door panels 18, 19 are mounted on the frame assembly 11 via fasteners or fastening mechanisms/devices such as bolts/nuts/screws suitably positioned at the hinges and drilled into the door panels and the frame assembly 11. When mounted, door panels 18, 19 may swing or pivot about the frame assembly 11 between an open configuration and a closed configuration. It is appreciable that Figure 1 is in a closed position.

[0051] In the embodiment shown in Fig. 1, panel 18 is inactive and panel 19 is active. The term “inactive” is used to illustrate that panel 18 may not be moved usually under normal operation conditions. The inactive panel 18 may be secured in its closed position to frame members 14,17 by flush bolts 20 to the top and bottom frames 14, 17. In its closed position, a longitudinal plane of the panel 18 is substantially parallel to the wall surface. The active panel 19 may be secured to the inactive panel 18 by suitable mechanism, such as a knob, lock and/or bolt. A locking mechanism 23 is mounted at a distal edge of the panel 19, away from the hinges.

[0052] The active door panel 19 may be secured to the inactive door panel 18 by a multipoint lock 22. The multipoint lock 22 may be equipped with a centre bolt. In some embodiments, gaskets (e.g. rubber gaskets) may be disposed at positions between the active and inactive door panels, and between the active and/or inactive door panels and the frame members 14, 15, 16, 17 (not shown). A compression lock 23 may be used to provide the necessary force to keep the gaskets under compression for the provision of an effective acoustic seal.

[0053] Figure 2 shows the cross sectional view as seen in the direction of arrows, along line A-A. The interface details between the top frame 14, the bottom frame 17 and the right door panel 19 are shown. There comprise multiple sealing regions 24, 25, 26, 27 & 28 forming an acoustic maze or labyrinth such as to form

an effective acoustic seal sealing system at the interface between the door panel 19 and the frames 14, 17.

[0054] The top frame 14 and bottom frame 17 may be mounted to the wall 12 through a rigid plate, also referred to as a stiffener element 29, which is suitably rigid. The stiffener element may be made of a relatively rigid material such as steel or stainless steel. In some embodiments, the stiffener 29 has a thickness of 5 millimetres (mm). The inner walls of frames 14, 17 may be lined with plasterboard 30 such as Gypsum or silicate based boards 30 at the rebated end. Such plasterboard 30 may have both sound-proofing properties and may be fire-rated. The internal (cavity) of the internal region may be filled with grouting 31 after stiffener 29 is secured to the wall. Grouting may be masonry or mortar and is added to provide sound deadening to the top frame 14. A layer of polymer filled sheet 32 may be added to the exterior wall of the top frame 14 and covered by steel cladding 33 to provide additional sound absorption. The polymer filled sheet 32 may be a bitumen-based polymer or other known materials for sound deadening qualities.

[0055] Figure 3 shows the cross sectional view as seen in the direction of arrows, along line B-B, shows the interface details between the frame element 15, the door panels 18,19 and the frame element 16. The door panel 18 may be attached to frame element 15, and door panel 19 may be attached to frame element 16, by hinges 21. The air-tight sealing regions between the frames 15, 16 and the door panels 18, 19 may be managed by seals 36,37,38,39 & 40. Similarly, the seals 41, 42, 43, and 44 provide the air-tight seal at the interface of the two door panels 18, 19. A compression lock 45 (which may be similar to compression lock 23) is configured to provide the necessary force to keep the seals 36,37,38,39 40, 41, 42, 43, 44 under compression when the door assembly 10 is operating in a closed state.

[0056] Figures 4 to 6 illustrate composite panels forming the door panels 18, 19. The composite panel comprises a first section and a second section, the first and second section separated by a sandwich section. The sandwich section may include a plurality of interfacing regions, each interfacing region shaped and

dimensioned to receive at least one fastener for joining the first section with the second section. Working in tandem with the fasteners is one or more sealing mechanisms, such as gaskets. The gaskets are shaped and dimensioned to surround and minimize any gaps in the vicinity of the interfacing region so as to reduce sound transmission through the composite panel.

[0057] Figure 4 shows the composite panel arrangement applied as door panel 18. As shown, the sandwich section comprises four interfacing regions. The four interfacing region may be arranged such as to comprise an outer pair of interfacing region and an inner pair of interfacing region. The outer pair of interfacing region is relatively nearer to the periphery of the door panel 18.

[0058] Each interfacing region is formed around the periphery of the door panel 18 (outer pair) or adjacent to the periphery of the door panel 18 (inner pair). The interfacing region each comprises metallic plates, such as steel plates or stainless steel plates disposed around the periphery of the door panel 18. The plates may be shaped and dimensioned to receive fasteners such as M5 bolts 51 for securing the first section of the door panel 18 with the second section of the door panel 18. Rubber gaskets are suitably positioned between the metallic plates and the fasteners. The sandwich section comprises a plurality of sealing mechanisms such as gaskets 47, 48, 49, 50, 52, 53, 54 and 55. The gaskets may suitably be formed from one or more elastomeric material/medium such as rubber. The M5 bolts may join the two sections of the door panels at a maximum pitch of 300 mm along the periphery of the door panel 18.

[0059] The outer pair of interfacing regions may be located in a staggered configuration vis-a-vis the inner pair of interfacing regions. As such, the boundary separating first section and the second section of the door panel 18 may not be a planar or linear boundary (see dotted line on Figure 4 denoting boundary between the first and section section).

[0060] Disposed between the inner pair of interfacing region, and held by the M5 bolt, is a layer of plasterboard 57. The plasterboard 57 can be fibre silicate, calcium silicate or magnesium silicate boards. The plasterboard 57 can include high-density fibre board. The plasterboard 57 is suitably located at a boundary area

between the first section and second section of the door panel 18.

[0061] In some embodiments, the plasterboard 57 may have a thickness of 6 mm. The plasterboard 57 may be arranged to rest on rubber insulation sheets (gaskets) 49, 55. The rubber sheets 49 and 55 may be affixed to the flange 64 which is welded to the structural section of the door panel 18. A layer of fire-rated material may be suitably applied. The fire-rated material may be filler 62 (example a Hilti-Firestop acrylic sealant having thickness of between 0.5mm and 1.0mm) applied on/to the underside of the plasterboard 57 before placing it on the rubber sheets 49, 55.

[0062] In some embodiments, to provide a desired level of vibration isolation, the rubber gaskets 47, 48, 49, 50, 52, 53, 54 and 55 each have a tensile strength of around 75 kilograms per cubic centimetres (kg/cm^3), a specific gravity of 1.34 ±0.05 , and a Shore A hardness rating of 55 ±5.

[0063] Figure 5 shows the composite panel arrangement applied as door panel 19. Similar to the configuration shown in Figure 4, the sandwich section comprises four interfacing regions. The four interfacing region may be arranged such as to comprise an outer pair of interfacing regions and an inner pair of interfacing regions. The outer pair of interfacing regions is relatively nearer to the periphery (e.g. side walls) of the door panel 19.

[0064] Each interfacing region is formed around the periphery of the door panel 19 (outer pair) or adjacent to the periphery of the door panel 19 (inner pair). The interfacing region each comprises metallic plates, such as steel plates or stainless steel plates disposed around the periphery of the door panel 19. The plates may be shaped and dimensioned to receive fasteners such as M5 bolts 51 for securing the first section of the door panel 19 with the second section of the door panel 19. Rubber gaskets are suitably positioned between the metallic plates and the fasteners. The sandwich section comprises a plurality of sealing mechanisms such as gaskets 47, 48, 49, 50, 52, 53, 54 and 55. The gaskets may suitably be formed from one or more elastomeric material/medium such as rubber. The M5 bolts may join the two sections of the door panels at a maximum pitch of 300 mm along the periphery of the door panel 19.

[0065] The outer pair of interfacing regions may be located in a staggered configuration vis-a-vis the inner pair of interfacing regions. As such, the boundary separating first section and the second section of the door panel 19 may not be a planar or linear boundary (see dotted line on Figure 5 denoting boundary between the first and section section).

[0066] Disposed between the inner pair of interfacing region, and held by the M5 bolt, is a layer of plasterboard 57. The plasterboard 57 can be fibre silicate, calcium silicate or magnesium silicate boards. The plasterboard 57 can include high-density fibre board. The plasterboard 57 is suitably located at a boundary area between the first section and second section of the door panel 19.

[0067] In some embodiments, the plasterboard 57 may have a thickness of 6 mm. The plasterboard 57 may be arranged to rest on rubber insulation sheets (gaskets) 49, 55. The rubber sheets 49 and 55 may be affixed to the flange 64 which is welded to the structural section of the door panel 19. A layer of fire-rated material may be suitably applied. The fire-rated material may be filler 62 (example a Hilti-Firestop acrylic sealant having thickness of between 0.5mm and 1.0mm) applied on/to the underside of the plasterboard 57 before placing it on the rubber sheets 49, 55.

[0068] It may be appreciable that the composite panel arrangement applied to the door panel 18, 19 is similar. However, the dimensions and shapes of the door panel 18, 19 may differ in accordance with operational requirements and for coupling with frame members 14, 15, 16, 17. In addition, the shape and dimensions of door panels 18, 19 may vary according to applications.

[0069] In some embodiments, to provide a desired level of vibration isolation, the rubber gaskets 47, 48, 49, 50, 52, 53, 54 and 55 each have a tensile strength of around 75 kilograms per cubic centimetres (kg/cm^3), a specific gravity of 1.34 ±0.05 , and a Shore A hardness rating of 55 ±5.

[0070] Figure 6 shows an exemplary composite panel which can form at least a part, or whole of the door panel 18, 19. The composite panel comprises at a first section, second section and a sandwich section arranged at the boundary of the

first and second section, which was described with reference to Figure 4 and Figure 5. The composite panel may comprise a metallic perimeter. The metallic perimeter may be a steel or stainless steel parameter.

[0071] Each individual section (first section, second section) contains multiple level of panels providing the necessary mechanical rigidity, noise absorption and noise dampening characteristics.

[0072] The first section comprises at least one structural reinforcement section 63, preferably two structural reinforcement sections 63 defined at two opposing ends of the first section. Each structural reinforcement sections 63 may be formed from a metallic reinforcement frame having at least one steel element running traverse the composite panel. In some embodiments, at least one end of the metallic reinforcement frame may be part of the perimeter of the composite panel. In the example shown in Figure 6, the structural reinforcement sections 63 are disposed at the left and right ends of the composite panel, and are filled with layers of plasterboards 60. The plasterboards 60 may be Gypsum boards 60.

[0073] The remaining portion of the first section comprises the following as infill:- multiple layers of plasterboards 57 and a insulation sheathing board/infill 59 which is fire-resistant, water-repellent and sound absorbent. Suitable insulation sheathing material includes the Rockwool^{TM} insulation material.

[0074] The details of the infill within the first section, and the way it is manufactured, is described as follows. Starting from the bottom (orientation made with reference to Figure 6, which may not necessarily be the orientation in normal operation condition), of the first section, a first layer of board 57 is glued to the steel perimeter or skin using a joint sealant 56. A second layer of board 57 is glued onto the first layer of board 57, with a layer of sealant 58 between the first layer and second layer of board 57. A third layer of the board 57 is glued onto the second layer of board 57, with a layer of sealant 58 between the second layer and third layer.

[0075] The sealant 56 can include a contact sealant such as Vitrobond HM969G, or a fire rated intumescent, low modulus, one component Class A

polyurethane sealant such as Bostik Fireban-One.

[0076] The sealant 58 can include a fire rated intumescent, low modulus, one component Class A polyurethane sealant (example: Bostik Fireban-One).

[0077] Each of the boards 57 can include fibre silicate, calcium silicate or magnesium silicate boards.

[0078] The insulation sheathing board/infill 59, such as Rockwool^{TM} insulation material 59, with density ranging from 60-80kg/m^3, can be used to fill up the first section of the composite panel. The top of the first section may be covered by a board 57 which rests on rubber insulation sheets 49, 55. The rubber sheets 49 and 55 may be fixed to a flange 64 (positioned around the sandwich section) which is welded to the structural section of the door panel. A layer of fire rated filler 62, for example Hilti-Firestop acrylic sealant having a thickness 0.5mm to 1.0mm may be applied on the underside of the board 57 before placing it on the rubber sheets 49, 55.

[0079] The second section of the composite panel comprises at least one structural reinforcement section 61. It is appreciable that multiple sections of reinforcement section 61 may be defined using metallic C channels positioned within the second section. Such C channels may be formed from metallic elements such as steel or stainless steel. Each C channel 66 may be welded to the steel perimeter for providing structural rigidity of the composite panel.

[0080] Sections of plasterboards, such as Gypsum board 60, or boards 57 may be attached/ glued to the steel perimeter/skin using joint sealant 56 depending on the space availability or constraint. Gypsum based material or board 61 may be used as infill within the C channels 66 and glued with the sealant 58. Two layers of boards 57 are bonded to each other and to the Gypsum board using sealant 58. The remaining regions of the second section are filled with Rockwool insulation material 59. The second section may include U-channel steel sections 67 which are fastened onto the first section via screws. When fastened, the U-channel steel sections 67 rest on the rubber sheets 47, 48, 52, 53.

[0081] It is appreciable that the first and/or second sections may also include one or more plates 65 to facilitate fastening of the sections via the sandwich section.

[0082] Described is a composite panel suitable for application as a door panel in an acoustical sound system 10.

[0083] The sandwich design of the door to frame interface and as well as combination of the layers of infill materials (including boards, insulation material) gives the necessary acoustic absorption, dampening, vibration isolation and mechanical rigidity needed to achieve the maximum sound transmission loss characteristics.

[0084] The metallic door panel system under the present disclosure comprises of a sandwich construction of two distinct sections of the door panels with layers of elastomeric medium separating the two sections and providing the vibration isolation.

[0085] It is appreciable that additional materials or boards may be added to the composite panel of the present disclosure. Such additional materials or board may include fire-retardant material/board. In particular, it is envisaged that the layer of fire rated filler 62 with similar characteristics as Hilti-Firestop acrylic sealant may be used.

[0086] It is appreciable that while the composite panel has been described in the context of an acoustical door system, the composite panel may be applicable to non-glazed windows systems or hatch doors.

[0087] It should be further appreciated by the person skilled in the art that variations and combinations of features described above, not being alternatives or substitutes, may be combined to form yet further embodiments falling within the intended scope of the invention.

Claims:

1. A composite panel comprising a first section and a second section separated by a sandwich section, wherein the sandwich section comprises at least one interfacing region to facilitate coupling between the first section and the second section, and the at least one interfacing region comprises an elastomeric medium.

2. The composite panel of claim 1, wherein the elastomeric medium comprises rubber.

3. The composite panel of claim 1 or 2, wherein the sandwich section comprises four interfacing regions.

4. The composite panel of claim 3, wherein the four interfacing region may be arranged such as to comprise an outer pair of interfacing regions and an inner pair of interfacing regions.

5. The composite panel of claim 4, wherein each interfacing region comprises metallic plates, such as steel plates or stainless steel plates disposed around the periphery of the composite panel.

6. The composite panel of claim 5, wherein the metallic plates may be shaped and dimensioned to receive fasteners for securing the first section with the second section of the door panel.

7. The composite panel of any one of the preceding claims, wherein the elastomeric medium are suitably positioned between the metallic plates and the fasteners.

8. The composite panel of any one of the preceding claims, wherein the first section and the second section each comprises at least one layer of silicate-based material and at least one layer of a gypsum based material.

9. The composite panel of claim 8, wherein the silicate-based material includes at least one of a fibre silicate board, a calcium silicate board and a magnesium silicate board.

10. The composite panel of claim 8 or 9, wherein the silicate-based material is a

high-density silicate board.

11. The composite panel of any one of claims 8 to 10, wherein the silicate-based material has a thickness of six (6) millimetres.

12. The composite panel of any one of the preceding claims, wherein the first section comprises at least one structural reinforcement section.

13. The composite panel of claim 11, wherein the structural reinforcement section is disposed proximate an end of the composite panel.

14. The composite panel of claim 12, wherein the first section comprises two reinforcement sections disposed at opposing ends of the composite panels.

15. The composite panel of claim 13 or 14, wherein the reinforcement section(s) are filled with gypsum based material.

16. The composite panel of claim 15, wherein the gypsum based material includes one or more gypsum boards.

17. The composite panel of any one of the preceding claims, wherein the composite panel comprises a steel perimeter.

18. The composite panel of claim 2, wherein the elastomeric material is in the form of gaskets, each gasket having a tensile strength of around 75 kilograms per cubic centimetres (kg/cm^3).

19. The composite panel of claim 18, wherein each gasket further comprises a specific gravity of 1.34 ±0.05.

20. The composite panel of claim 18 or 19, wherein each gasket further comprises a Shore A hardness rating of 55 ±5.

21. An acoustical door system comprises at least one composite panel forming at least one acoustical door panel, the composite panel comprising a first section and a second section separated by a sandwich section, wherein the sandwich section comprises at least one interfacing region to facilitate coupling between the first section and the second section, and the at least one interfacing region

comprises an elastomeric medium.

22. The acoustical door system of claim 21 comprising two composite panels forming a corresponding two-door leaf configuration.

23. The acoustical door system of claim 22, further comprises a door frame, wherein the two composite panels is coupled to the door frame assembly.

24. The acoustical door system of claim 23, wherein the door frame assembly comprises a polymer filled sheet.

25. The acoustical door system of claim 24, wherein the polymer filled sheet is a bitumen-based polymer.

26. A method of manufacturing a composite panel comprising the steps of

a. providing a first section and a second section;

b. providing a sandwich section, the sandwich section comprises at least one interfacing region and the at least one interfacing region comprises an elastomeric medium; and

c. coupling via the sandwich section the first section and the second section.

27. The method of claim 26, wherein the first section is comprising the steps of:

a. attaching, using a first sealant, a first layer of plasterboard to a perimeter of the composite panel;

b. attaching, using a second sealant, a second layer of plasterboard to the first layer of plasterboard; and

c. attaching, using the second sealant, a third layer of plasterboard to the second layer of board.

28. The method of claim 27, wherein the first sealant includes a contact sealant or a fire rated intumescent sealant.

29. The method of claim 27 or 28, wherein the second sealant includes a fire rated intumescent polyurethane sealant.