

ACOUSTICALLY INSULATED WALL ASSEMBLY

TECHNICAL FIELD

The present invention relates to walls and, in particular, to acoustically insulated walls
5 for use in the construction of commercial and residential buildings.

BACKGROUND

Acoustically insulated walls and wall systems are well known. Known methods include
the use of acoustic insulation material being housed within the wall cavity. Whilst
10 acoustic insulation on its own will assist in muffling noise, to significantly reduce noise
transfer between rooms requires attention also to the appropriate layers of plasterboard
and close attention to eliminating flanking noise.

Conventional acoustically insulated wall systems are constructed from masonry panels,
15 acoustic insulation and plasterboard. Known wall systems have masonry panels that are
disposed in a substantially flush array. Such wall systems have the disadvantage when
subjected to stress, for example, that may be encountered during a fire or when subjected
to high wind pressures, the wall system's lack of strength, rigidity and stiffness causes
the structural integrity of the wall system to be compromised. The wall may bulge and
20 move outwardly in response to the stress applied.

Other conventional acoustic wall systems are constructed from heavy weight materials
such as bricks and are conventionally relatively thick. Such walls have the disadvantage
of taking up valuable floor space which is a premium in multi-storey, multi-occupant
25 buildings, and increase the weight applied to the floor and the associated cost of
strengthening the structure of the building.

Builders are currently locked into very tight budgets typically suffering cost blowouts
due to increased labour costs. Developers are keen to progress with further building
30 developments but are constrained by the rising costs incurred when undertaking a
construction project. Presently, labour costs are between 60% and 70% of the total

construction cost associated with building a wall. Minimising the number of components that are used in the construction of a wall can simplify construction, shorten the time taken to build a wall and thus reduce the overall construction costs.

- 5 It is therefore an object of the present invention to provide an acoustic wall system which goes at least some way towards overcoming or at least minimizing the prior art problems or limitations outlined above.

SUMMARY OF THE INVENTION

- 10 According to a first aspect of the present invention there is provided a wall assembly comprising:
a masonry wall comprising a first and second array of a plurality of masonry panels arranged in a staggered array, the plurality of masonry panels having a first linerboard secured to one side of the staggered array and a second linerboard secured to the other
15 side of the staggered array, and wherein the panels of the first array do not contact each other or any other panels in the second array.

Preferably, the panels from the first array overlap the panels from the second array.

- 20 Preferably, at least one insulation batt abuts an end of a masonry panel in the first array of panels and extends into a gap between an adjacent panel in the first array and an opposed panel in the second array of panels.

Preferably, the acoustic insulation comprises an acoustically insulating batt.

25

Preferably, at least one of the first and second linerboards is a plasterboard.

Preferably, at least one of the first and second linerboards is a fibre-cement board.

- 30 Preferably, wherein the overlap relationship of a masonry panel from one array with an adjacent masonry panel from the other array is between 90mm and 110mm.

Preferably, the overlap relationship of a masonry panel from one array with an adjacent masonry panel from the other array is between 95mm and 105mm.

- 5 Preferably, the thickness of the masonry panel is about 75mm.

Preferably, the thickness of the acoustic insulation is about 50mm.

- 10 Preferably, at least one of the masonry panels are substantially parallel to at least one of the first or second linerboards.

According to a second aspect of the present invention there is provided a wall assembly having insulation material spanning between the panels from the first array and the panels from the second array.

15

According to a further aspect of the present invention there is provided a wall assembly comprising:

- 20 a wall of a building comprising a first and second array of a plurality of building panels arranged in a staggered array, the plurality of building panels having a first linerboard secured to one side of the staggered array and a second linerboard secured to the other side of the staggered array, and wherein the panels of the first array do not contact each other or any other panels in the second array.

BRIEF DESCRIPTION OF THE DRAWINGS

- 25 In order to facilitate a better understanding of the nature of the present invention, a preferred embodiment of an acoustically insulated wall assembly will now be described, by way of example only, with reference to the accompanying drawings in which:

- 30 Fig 1 depicts a perspective view of the wall system of the present invention with the acoustic insulation removed.

Fig 2 depicts a partial sectional view of a preferred embodiment of the present invention depicted in Fig 1 with the acoustic insulation removed.

5 Fig 3 depicts a partial sectional view of a preferred embodiment of the present invention depicted in Fig 1 with the acoustic insulation disposed between said first and second linerboards.

10 Fig 4 depicts a partial sectional view of a preferred embodiment of the present invention depicted in Fig 1 with two relatively thin layers of the acoustic insulation disposed between said first and said second linerboards.

15 Fig 5 depicts a partial sectional view of a preferred embodiment of the present invention depicted in Fig 1 with two layers of relatively thick acoustic insulation disposed between said first and said second linerboards.

Fig 6 depicts a partial sectional view of a preferred embodiment of the present invention depicted in Fig 1 with three layers of the acoustic insulation disposed between said first and said second linerboards.

20 **BEST MODE OF CARRYING OUT INVENTION**

Masonry panels 1 are preferably constructed from conventional non-toxic, lightweight masonry called Autoclaved Aerated Concrete (AAC). This process produces extremely small, finely dispersed air pockets within the material. This results in a lightweight aerated concrete panel which is about a quarter the weight of conventional brickwork.

25 Preferably, these masonry panels are approximately 75mm thick. An example of suitable masonry panel is the Hebel Power PanelTM. However, any similar or other suitable masonry panels can be used to carryout the invention. The preferred material form of the masonry unit in this specification is concrete including autoclaved aerated concrete, calcium silicate, clay, stone or glass.

30

First and second plaster linerboards 2 and 3 are preferably constructed from machine made sheets composed of a gypsum core encased in a heavy-duty linerboard. The linerboard is folded around the long edges to reinforce and protect the core. The board ends are cut square. An example of suitable material is CSR Gyprock™ plasterboard.

- 5 However, any similar or other suitable linerboard products can be used to carry out the invention.

Figure 1 depicts a wall system comprising a staggered array of masonry panels 1 in accordance with the present invention. In this embodiment, the masonry panels 1 of the first array 5 overlap with the masonry panels 1 of the second array 6.

Figure 2 depicts a first preferred embodiment of the present invention. The wall assembly of the present invention consists of a first array 5 of masonry panels 1 and a second array 5 of masonry panels 1 in a staggered array. Each masonry panel 1 from the first array 5 overlaps with an opposed masonry panel 1 from the second array 6. None of the masonry panels 1 from the first array 5 are in contact with any other masonry panels 1 in said first array 5 or said second array 6. None of the masonry panels 1 of said second array 6 are in contact with any other masonry panels 1 from said second array 6 or said first array 5. In this way, a gap 10 is formed between the overlapping end portions 7 of the masonry panels 1 of said first array 5 and said second array 6. Gap 10 is formed between adjacent panels 1 in said first array 5 and an opposed panel 1 in said second array 6.

Preferably, the overlap of a masonry panel 1 from the first array 5 from a masonry panel 1 from the second array 6 is about 50mm. In another preferred embodiment, the overlap of a masonry panel 1 from the first array 5 from a masonry panel 1 from a second array 6 is about 100mm. However, other suitable amounts of overlap between adjacent panels 1 of the same array (said first or second array 5,6) may be utilised. The gap 10 preferably has a width between the opposed panels 1 of the different arrays of about 20mm although other suitable widths such as 30mm, 100mm or any other suitable width may also be used within the scope of this invention.

Figure 3 depicts one preferred embodiment of the present invention with acoustic insulation 4 disposed within the cavity formed between the first and second plaster linerboards 2, 3. Any suitable form of acoustic insulation can be used such as, 5 acoustically insulating batts, glasswool or RockwoolTM fibres. Preferably, the acoustic insulation is approximately 50mm thick although other suitable widths of acoustic insulation such as 75mm, 115mm, 140mm or any other suitable width may be used within the scope of this invention. Examples of suitable acoustic insulation materials are CSR BradfordTM Insulation products such as, SoundscreenTM Batts, RockwoolTM 10 Building Blankets (RockwoolTM Building Blanket is an insulation material manufactured from a molten mixture of natural rock and recycled blast furnace waste products, bonded with a thermosetting resin) or other RockwoolTM products including, AcousticlادTM, FibermeshTM and FibertexTM. However, any similar or other suitable acoustic insulation can be used to carry out the invention.

15 As depicted in Figure 3, acoustic insulation 4 is preferably installed by abutting a first end of an acoustic insulation batt 4 against an end portion of a masonry panel 1 from either the first array 5 or second array 6. The other end of the acoustic insulation batt 4 is then bent and compressed into the gap 10 formed between the two overlapping end 20 portions of adjacent masonry panels 1. The acoustic insulation batt 4 abuts an end of a masonry panel 1 in said first array 5 and extends into the gap 10 between an adjacent panel 1 in said first array 5 and an opposed panel 1 in said second array 6. In the preferred embodiment shown in Figure 3, the length of the acoustic insulation batt 4 is 600mm. However, the preferred distance between each adjacent panels 1 of each array is 25 only 500mm and the preferred overlap distance of gap 10 is 50mm. Therefore, the 600mm insulation batt 4 is compressed into a 550mm area within the wall assembly of the present invention. Thus, there is no need for additional restraints or fixtures to be used to secure the acoustic insulation batts 4 into the wall assembly as they will be securely held in place by frictional forces alone. Thus, there is no need for studs, 30 adhesives or the like to be used to secure the acoustic insulation 4 within the wall assembly. Without the need for studs to be used when erecting the wall assembly, there

is no need for secondary realigning of studs prior to the screwing off of the first plaster linerboard 2 or second plaster linerboard 3. This results in faster erection time when constructing the wall system of the present invention compared to conventional wall systems.

5

The advantages of having a wall system with a gap 10 between the opposed masonry panels 1 of said first array 5 and second array 6 are as follows. Services, such as gas, electricity, audio cables, water pipes and the like can be fed between the panels 1 to service both sides of the wall. This means that electrical power points can be fitted to both first plaster linerboard 2 and second plaster linerboard 3. Whilst the wall assembly of the present invention depicted in Figures 1 to 3 has a greater thickness than conventional acoustic wall systems due to the gap 10 between opposed panels 1 of said first array 5 and second array 6, the wall assembly of the present invention retains a semi solid feel, in fact, more solid than a wall assembly that utilises a steel stud.

15

Depending upon the amount of overlap between adjacent panels 1 of said first array 5 and/or said second array 6, a higher fire performance rating may be obtained for the wall assembly of the present invention compared to conventional acoustic wall systems without the need for using fire rated insulation or plaster linerboard. However, it is within the scope of this invention that fire rated insulation and/or plaster linerboard be utilised as well. Notwithstanding the higher fire rating that may be achieved, a higher acoustic performance may be obtained due to the cavity geometry between the panels 1 and the first plaster linerboard 2 and/or second plaster linerboard 3.

25

Having the gap 10 between opposed masonry allows services, such as electricity, plumbing and the like, to be located within the gap 10. This eliminates the need for vertical chasing and the subsequent production of harmful silica dust. Silica dust is the cause of a form of pneumoconiosis known as silicosis (also known as Grinder's disease).

30

Figures 4 to 6 depict alternative embodiments of the present invention having like features to the embodiments depicted in Figures 1 to 3. There remains a plurality of

masonry panels 1 arranged in a first array 5 and a plurality of masonry panels 1 arranged in a second array 6. However, each of the various embodiments depicted on Figures 4 to 6 show different arrangements of the acoustic insulation 4 between a first linerboard 2 and a second linerboard 3.

5

In Figure 4, two layers of relatively thin acoustic insulation batts 4 are disposed between the first linerboard 2 and the second linerboard 3. The combined width of the two relatively thin layers of insulation batts 4 is narrow enough to fit between the gap 10 between a masonry panel 1 from the first array 5 and an opposed adjacent masonry panel 1 from the second array 6.

10

Figure 5 depicts the wall assembly of the present invention having two layers of relatively thick acoustic insulation batts 4 disposed between the first linerboard 2 and the second linerboard 3. As the combined width of the two relatively thick layers of insulation batts 4 is greater than the width of the gap 10, the edges of the insulation batts 4 from either of the two layers of relatively thick insulation batts 4 are "tucked" into the gap 10 to hold the insulation batts 4 in place by frictional engagement with the masonry panels 1.

15

Figure 6 depicts the wall assembly of the present invention having three layers of acoustic insulation batts 4. The central layer of acoustic insulation batts 4 have a thickness that is sufficiently narrow to fit through the gap 10. Second and third layers of acoustic insulation batts 4 are then installed into the cavities 17 that are formed between adjacent masonry panels 1 of the first array 5 and adjacent masonry panels 1 of the second array 6.

20

25

It must be understood that any suitable arrangement of insulation batts 4, including those not shown in the drawings may be utilised within the scope of this invention.

Whilst the abovementioned embodiments refer to plaster linerboards 2 or 3, it should be understood that in other not shown embodiments the plaster linerboards 2 or 3 may be

30

replaced by other forms of linerboards. For example fibre cement linerboards could be used when the wall system of the present invention is used in wet areas such as laundries, bathrooms and kitchens.

5 Whilst in the embodiments shown in the drawings there is no need for additional restraints or fixtures to be used to secure the insulation batts 4 into the wall assembly, in other embodiments not shown in the drawings, fastening means such as adhesive or pins or any other suitable fastening means may be used to securely hold the acoustic insulation batts 4 in place.

10 In another embodiment not shown in the drawings, masonry panels 1 of the first array 5 may be connected to the masonry panels 1 of the second array 6 by way of fastening means. The fastening means may preferably be a screw, a bracket or any other type of resilient mechanical fastener. The fastening means connecting the masonry panels 1 of
15 the first array 5 to the masonry panels 1 of the second array 6 provide the wall assembly of the present invention with added strength and rigidity. For example, when the masonry panels 1 of the first array 5 are subjected to stress, such as those encountered during a fire or high winds, will transfer some of this stress to the masonry panels 1 of the second array 6 such that the stresses are "shared" between the masonry panels 1 of
20 the first and second arrays 5,6. As a result, when the masonry panels 1 of the first array 5 are connected to the masonry panels 1 of the second array 6 by way of the fastening means, the wall assembly of the present invention is capable of withstanding much higher levels of stress than when the masonry panels 1 of the first and second arrays 5,6 are not connected.

25 Whilst the invention has been described with reference to masonry panels 1, it should be understood that in other embodiments not shown in the drawings, the present invention also related to other forms of building panels having similar characteristics to masonry panels. For example, suitable panels that may be included within the scope of the present
30 invention include building panels having a metal lined aerated concrete core, a metal lined glasswool core, a metal lined polystyrene core, a composite mixture of concrete

and wood or any other similar building panel having similar characteristics to masonry panels.

5 The term "comprising" (and its grammatical variations) as used herein is used in the inclusive sense of "having" or "including" and not in the exclusive sense of "consisting only of".

CLAIMS

1. A wall assembly comprising:
a masonry wall comprising a first and second array of a plurality of masonry panels arranged in a staggered array, the plurality of masonry panels having a first linerboard secured to one side of the staggered array and a second linerboard secured to the other side of the staggered array, and wherein the panels of said first array do not contact each other or any other panels in said second array.
2. The wall assembly of claim 1 wherein the panels from said first array overlap the panels from said second array.
3. The wall assembly of claim 2 wherein at least one insulation batt abuts an end of a masonry panel in said first array of panels and extends into a gap between an adjacent panel in said first array and an opposed panel in said second array of panels.
4. The wall assembly of claim 3 wherein said acoustic insulation comprises an acoustically insulating batt.
5. The wall assembly of claim 1 wherein at least one of the first and second linerboards is a plasterboard.
6. The wall assembly of claim 1 wherein at least one of the first and second linerboards is a fibre-cement board.
7. The wall assembly of claim 2 wherein the overlap relationship of a masonry panel from one array with an adjacent masonry panel from the other array is between 90mm and 110mm.

8. The wall assembly of claim 7 wherein the overlap relationship of a masonry panel from one array with an adjacent masonry panel from the other array is between 95mm and 105mm.
9. The wall assembly of claim 1 wherein the thickness of the masonry panel is about 75mm.
10. The wall assembly of claim 1 wherein the thickness of the acoustic insulation is about 50mm.
11. The wall assembly of claim 1 wherein at least one of the masonry panels are substantially parallel to at least one of the first or second linerboards.
12. The wall assembly of claim 2 having insulation material spanning between the panels from said first array and the panels from said second array.
13. A wall assembly comprising:
a wall of a building comprising a first and second array of a plurality of building panels arranged in a staggered array, the plurality of building panels having a first linerboard secured to one side of the staggered array and a second linerboard secured to the other side of the staggered array, and wherein the panels of said first array do not contact each other or any other panels in said second array.
14. A wall assembly substantially as hereinbefore described with reference to the accompanying drawings.