

Title: Mobile partitioning wall**Description**

The invention is based on a mobile partitioning wall according to the generic part of patent claim 1. The mobile
5 partitioning wall has several wall elements, which are displaceably disposed at running rails.

A mobile partitioning wall with several wall elements, which are displaceably guided in a running rail, is known from DE-OS 24 04 784. Each wall element has a supporting
10 structure, which is formed by a surrounding frame consisting of profiles. Covering panels are mounted to both sides of the frame and, moreover, further add-on and accessory parts are attached thereto. The hollow space
15 thermally insulating and sound-absorbent materials.

The frame-based supporting structure results in wall elements having a high weight and requires therefore suspension devices with a corresponding stable configuration. With such a structure, the increasing
20 requirements with regard to thermal and sound-insulation can only be satisfied when using additional respectively thicker covering panels, while increasing the overall weight.

As mobile partitioning walls, due to varying installation situations and dimensions, are individually manufactured,

in particular the realization of the frame requires an expensive and precise dimensional manufacturing and connecting of the profiles. A provision and production of standardized components for such wall elements is only
5 feasible to a very limited extent.

The object of the invention is to provide a mobile partitioning wall according to the generic part of patent claim 1, the structure of the wall elements being technically simple to manufacture and to install and being universally
10 applicable.

This problem is solved with the features specified in the characterizing part of patent claim 1. Advantageous configurations of the subject matter of patent claim 1 are indicated in the dependent claims, the invention being
15 applicable to both automatically and manually displaceable wall elements of partitioning walls.

The mobile partitioning wall according to the patent claim 1 has the advantage that, on account of the inventive self-supporting structure of the wall elements, manufacturing
20 and mounting are considerably simplified. Unlike the already known supporting frame structure, a panel-shaped and layered composite structure with sandwich technique allows for a simple and extensively automated manufacturing.

The selection of the materials and their layering is realized in particular considering weight-specific and acoustic aspects, in addition, the external layers being selected considering visual and practical aspects. Complicated
5 manufacturing of a supporting frame structure is eliminated, because just the cutting to size and the connecting of the layers is required to realize the basic structure for a wall element.

The different materials of a layer are kept as supplies in a
10 panel-shape and are cut to the required dimension when needed. In this case, preferably dimensioning in a raster measure is advantageous, in order to efficiently realize the different dimensions. Building the basic structure of the wall element is realized by arranging layered panels and
15 feeding adhesives and filling compounds. Thus the variable selection and disposition of layers and filling materials allow for quickly and easily replying to specific customer needs. In a particular embodiment, it is likewise possible to combine pre-fabricated layered structures or even to
20 combine complete basic structures, again as a separate partial layer, to form a wall element.

The surrounding border area of the wall element, at least sectionally, is formed as a profile, in order to achieve a positive connection to the border areas of adjoining wall
25 elements. Such border areas are formed in particular at the

vertical edges, which border areas cooperate with a complementarily formed border area of the adjoining wall element and thus provide a soundproof and stable connection.

- 5 The corresponding profiling may be realized directly through shaping measures during the manufacturing of the core or through corresponding inserts, such as moulded plastic material parts or metallic profiles. The profiling can be made based on a tongue and groove system. Other
10 positive configurations, such as undulated, semicircular, circular or trapezoidal are suitable as well. In addition, joints made for example from rubber or magnetic materials may be placed at these borders as well.

Smaller basic units having such profiled border areas allow
15 for example to create large-surface wall elements in horizontal and vertical extensions.

Furthermore, the mounting of modular and variable add-on parts and of functional units is realized at horizontal and vertical edges. For this purpose, recesses, to which the
20 add-on parts are attached directly or to mounting elements pre-mounted at that location, are provided in the wall elements. Preferably already during the manufacturing of the basic structure, corresponding profiles or mounting elements are machined into the recesses.

The manufacturing and mounting expense is considerably reduced altogether, because individual mounting solutions do not need to be figured out any more. In particular, the manual manufacturing steps are considerably reduced, 5 because a major portion is now automatized. Moreover, the wall element can be likewise shipped as an assembly kit. Final measures for cutting the panel to size, in particular for the add-on parts, and their final mounting can be done on the installation site as well.

- 10 A wall element according to the inventive structure has a core which, on both sides, is covered by one exterior shell, respectively. Preferably, the exterior shell is multi-layered and consists of an exterior cover layer, a middle layer and an interior layer. Overall, the two exterior shells are formed 15 to be heavy and soundproof and are sonically separated by the preferably soft core material. Through the full connection, preferably bonding, all layers and materials of the wall element are combined to a self-supporting unit. The sound insulation can be realized at a lower expense, 20 because the selection of appropriate materials and their assembling already result in a considerable improvement. With the intention to improve the rigidity of the wall element while maintaining the sound insulation at the same time, the contact surfaces, depending on the material selection, 25 are profiled.

Through the selection of most different materials, the use of panel-shaped and foamed layers and their connection to a structure in a sandwich technique, the individual properties are advantageously combined in such a way
5 that they sum up to a considerable improvement. The wall element, for example, has considerably higher bending and torsional rigidities than the sum of the properties of separately used layers of the exterior shell and core. Such structured panels transfer substantial loads. The structure
10 of the exterior shell, as well as the thickness and density of the core are decisive factors. Compared to a profile frame structure, the result is a reduced wall thickness and a lower weight with an increase in stability.

The core material is made from a honeycomb structure,
15 which in particular consists of paper or aluminium. Furthermore, solid material made from polystyrene foam, PU-foam, mineral wool, rock wool or the like can be used.

Preferably, the exterior shells are formed from several layers. Metallic materials, such as sheet steel or sheet
20 aluminium, and furthermore, plastic material (PVC, PC), laminated materials, fibreglass reinforced plastics (GRP), gypsum, wood, cork, etc. are suitable for the middle layer. The layer, disposed on the inside between the middle layer of the exterior shell and the core, serves as an increase to
25 the shell weight and as a damping material and preferably

consists of bitumen. This middle layer serves at the same time as the support for the exterior cover layer, which forms the visible surface. This may be a priming film, a laminate, laminar material or melamine resin. Furthermore, veneers,
5 textile or glass surfaces are possible.

Bonding materials and bonding techniques are used for connecting the individual layers of the exterior shell. The so-called long fibre injection method (LFI) is used as the preferred method. In this case, fibreglass strands are cut
10 and, in a single operational step, are fed simultaneously with PUR-components to a tool device and blended. The finished mixture is then sprayed between the corresponding layers of the exterior shell and, once hardened, creates a permanent connection.

15 A particularly advantageous structure of the wall element is achieved with a soft PUR-foam core or melamine foam, which is surrounded on both sides by a weighting layer of bitumen. Then the middle layer of the exterior shell follows, consisting of GRP enveloped paper honeycombs filled with
20 PU-foam, and has an exterior cover layer formed according to customer specifications. Such a combination of materials has excellent acoustic properties offering the optimum solution with regard to the parameters of sound insulation and weight per unit area.

Such structured wall elements are suitable to build partitioning walls having the most different configurations. In particular, the substantial weight reduction achieves a lower load on the suspension devices and on the drive means and, on the other hand, by improving the sound insulation, the number of application variants is increased.

The wall elements can be formed as a solid element, passage door, angle element, window element, compensating element, swing leaf, double-action leaf or as following automatic doors. All wall elements can be moved out of the axis of the partitioning wall and parked at a predetermined location in a space-saving manner. Each wall element is displaceable, at one or two points, by means of carriages in a running rail, which is attached to the ceiling.

The overall partitioning wall fulfils the requirements of the thermal insulation regulation such that, even at low outside temperatures, there are no disadvantages as to energy and cost.

The invention will now be described in more detail by means of one exemplary embodiment in conjunction with the drawings, in which:

Figure 1: shows a diagrammatical structure of a wall element.

Figure 2: shows a diagrammatic layered structure of a wall element in an enlarged illustration according to Figure 1.

5 Figure 3: shows a partial cross-section of adjoining wall elements having a profiled border section.

In the Figures, similar or similarly functioning structural parts are identified by the same reference numerals.

10 A mobile partitioning wall is composed of several panel-shaped, independently displaceable, suspendedly supported wall elements 1 and is suitable to subdivide a room or to be used as an outside termination, wherein horizontally or vertically disposed mounting elements 9 allow for integrating floor and ceiling terminations, for
15 example. Depending on the execution, the individual wall elements may be displaced manually or by motor power. All wall elements can be moved out of a space-saving parking position, a so-called stacking location, into the axis of the partitioning wall and be braced in that location.

20 For the sake of clarity, a wall element 1 is only partially illustrated in a cross-section in Figure 2 with the intention to show the structure in corresponding details.

In the exemplary embodiment, the wall element 1 consists of a core 2 and of exterior shells 3, 4 disposed on both

sides. This results in a homologous structure. The exterior shells 3, 4 are formed to be heavy and soundproof and are sonically separated by the preferably soft core material. The exterior shells 3, 4 and the core 2 are combined
5 through a full bonding, in order to form a self-supporting unit.

The core 2 is made from a honeycomb structure, which in particular consists of aluminium or paper. Furthermore, solid material made from polystyrene foam, PU-foam,
10 mineral wool, rock wool or the like can be used.

Both exterior shells 3, 4 are made from several layers and consist, respectively on the inside, of a weighting and sound insulating layer 301, 401, a middle layer 302, 402 made from honeycomb material and of an exterior cover
15 layer 303, 403. The layers are bonded to each other by means of LFI-injection.

Metallic materials, such as sheet steel or sheet aluminium, and furthermore, plastic material (PVC, PC), laminated materials (GRP), gypsum, wood, cork, etc. are suitable for
20 the middle layers 302 and 402. The layers 302 and 402 serve as the support for the visible cover layers 303 and 403. Their surface may consist of priming film, laminate, laminar materials, or melamine resin. Furthermore, veneers, textile or glass surfaces are possible.

A particularly advantageous structure of the wall element 1 is achieved with a soft core made from PUR integral foam or melamine foam. Preferably, the mass amounts to 25 to 75 kg/m³ with a thickness of 40 to 80 mm. Preferably, the weight per unit area amounts to 10 to 40 kg/m². A weighting layer 301, 401, made from bitumen, is disposed on both sides and has a thickness of about 5 to 8 mm and a weight per unit area of about 5 to 15 kg/m². The following middle layer 302, 402 is made from GRP enveloped paper honeycombs filled with PU-foam. Finally, the exterior cover layer 303, 403, which is about 1 to 4 mm thick, is applied to both sides. Such a combination of materials has excellent acoustic properties offering the optimum solution with regard to the parameters of sound insulation and weight per unit area, such as to reach a sound insulation factor of about 55 dB.

Figure 3 shows parts of adjoining wall elements 1 in a cross-section and in particular the configuration of the respective border area 7 at the vertical edges. Profiled structures 8, which positively and complementarily cooperate, are formed respectively at the border areas 7.

List of References

	1	wall element
	2	core
	3	exterior shell
5	301	interior layer
	302	middle layer
	303	cover layer
	4	exterior shell
	401	interior layer
10	402	middle layer
	403	cover layer
	7	border area
	8	structure
	9	mounting element

Patent claims

1. A mobile partitioning wall with several wall elements (1), which are displaceably suspended at running rails, characterized in that the wall elements (1) are formed without supporting frame.
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2. A mobile partitioning wall according to patent claim 1, characterized in that the wall elements (1) are formed in layers in a sandwich technique.
3. A mobile partitioning wall according to patent claim 1 or 2, characterized in that the wall elements (1) consist of a core (2) and of at least single layered exterior shells (3, 4) disposed on both sides of the core (2).
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4. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the core (2) and the layers of the exterior shells (3, 4) are fully bonded.
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5. A mobile partitioning wall according to one of the preceding patent claims, characterized in that profiled contact surfaces are formed between the core (2) and the exterior shells (3, 4).
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6. A mobile partitioning wall according to one of the preceding patent claims, characterized in that

border areas (7) surrounding the wall element (1) are formed to be at least partially profiled.

- 5 7. A mobile partitioning wall according to one of the preceding patent claims, characterized in that border areas (7) surrounding the wall element (1) are formed, at least partially, with mounting elements (9).
- 10 8. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the core (2) has a honeycomb structure and consists of paper or aluminium.
- 15 9. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the core (2) is made from polystyrene foam, PUR-foam, melamine foam, mineral wool or rock wool.
10. A mobile partitioning wall according to one of the preceding patent claims, characterized in that an interior layer (301, 401) of the exterior shells (3, 4) is formed to be weighting and consists of bitumen.
- 20 11. A mobile partitioning wall according to one of the preceding patent claims, characterized in that a middle layer (302, 402) of the exterior shells (3, 4) consists of metal, plastic material, laminar material, wood, cork, glass or gypsum.

12. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the middle layer (302, 402) of the exterior shells (3, 4) consists of GRP enveloped paper honeycombs filled with PU-foam.
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13. A mobile partitioning wall according to one of the preceding patent claims, characterized in that exterior shells (3, 4) have an exterior cover layer (303, 403) for the surface coating.