

System for the construction of a sound insulation element, connecting elements for connecting of profile-elements of a sound insulation element and connector for connecting a support profile to at least one profile element of a sound insulation element

- 5 The invention relates to a system for the construction of a sound insulation element to be arranged in a ceiling area of a building and to the components of such a system.

Main subject of the invention is a system for the construction of a sound insulation element to be arranged in a ceiling area of a building, consisting of a frame and a sound insulation
10 panel to be inserted into the frame, in particular of mineral fibers bonded with binding agents. A sound insulation element in the sense of this invention has therefore several parts to be combined, as at least the frame and one or several panels made of sound insulation material being inserted into the frame. The sound insulation element in the sense of this invention
15 may contain other components like liners being incorporated into the frame and/or hanging elements to connect the frame to a ceiling or grid structure being arranged in a room. Furthermore, main subject of the invention are connecting elements for connecting of profile-elements of a sound insulation element to be arranged in a ceiling area of a building whereby the profile-elements are designed to be compatible with one another, being identical in cross-section and having at least two receptacles for inserting a first and a second
20 connecting element. Finally, main subject of the invention is a connector for connecting a support profile to at least one profile element running perpendicular to the support profile in a sound insulation element to be arranged in a ceiling area of a building.

25 Systems for the construction of a sound insulation element to be arranged in a ceiling area of a building and their components are known from the prior art.

For example, US 4,744,188 discloses a suspended island ceiling system in which conventional grid runners are interconnected to produce a rectangular grid. The grid defines openings in which sound insulation panels are supported. The grid includes parameter
30 runners and inner runners which connect at their ends to the parameter runners at spaced locations along the lengths of the parameter runners. Channel-shaped border members are supported on the parameter runners and provide a finish edge appearance for the island. The border members provide an outer vertically extending base wall and vertically spaced, horizontally extending legs. The upper leg extends over the adjacent parameter runner and

engages the upper surface and one side of the bulb thereof. The lower leg extends along the lower side of the parameter runners and engages the lower side and at least one side of the flange of the parameter runners. The ends of the border members are mitered to provide a miter joint and are provided with longitudinally extending openings to receive and conceal corner connectors. The upper leg of the border member is provided with a groove aligned with the adjacent bulb of the parameter runners through which fasteners may be installed to interconnect the border members and the parameter runners. At least one of the legs is provided with opposed projections which engage opposite sides of the adjacent portion of the parameter runners to laterally position the border members in both directions.

The suspended island ceiling system according to US 4,744,188 is built up of several components as described before. These components are combined in an assembly containing all necessary components to build up the suspended island ceiling system. Nevertheless, such an assembly is limited to a certain suspended island ceiling system and the manufacturer of such suspended island ceiling systems has to combine different construction elements into different first assemblies each being used to build up a certain suspended island ceiling system according to the order of a client. Every assembly is therefore a tailor-made assembly which increases the work of constructing the assembly and collecting all parts in the assembly which increases the costs extremely.

In fact, these ceiling systems are well known and they are often in the form of a grid-type frame used to support ceiling tiles of various types, such as sound insulation boards. Such ceiling systems are typically of a grid type, supported at their edges on wall-mounted rails. The grid, in which usually rectangular tiles or boards may be supported, may comprise a network formed by an array of parallel, spaced runners supported on wall rails, which runners are crossed by an array of cross-tees in segments across the extent of the ceiling system. The cross-tees are effectively supported by the runners, except at the perimeter, where the cross-tees are supported at their outermost end on the wall rail.

Additional supports for the grid runners may be provided in the form of anchors fixed to the ceiling at various points and extending to the grid, thereby forming spaced apart suspension elements to the grid.

In some cases, like in US 4,744,188, a ceiling grid system may be spaced apart from the

side walls in a room. In particular, a perimeter rail encompassing a ceiling system may be completely or partly unsupported by any wall. Such ceiling grid systems may be known as island ceiling systems, being wholly supported by using ceiling anchors. Described here as ceiling system it should be clear that such system can be mounted in a wall area of a building, too, if an anchor system is used with anchor being bending resistant.

For the customer the assembly for such a system contains a lot of components and needs a detailed assembly instruction. To build up the suspended island ceiling system according to US 4,744,188 is therefore a complicated installation work which takes a long time as someone has to follow all steps of the assembly instruction which mostly ends up in looking for special parts which decreases the construction progress. The assembly instruction needs to be present and clear. Furthermore, all components of the system should be self-explaining in where and how to use and/or to combine with other components of the system.

Suppliers of such systems are frequently asked to provide or install them in a wide range of sizes, to adapt to particular spaces or needs. This can entail technicians who fit the systems to cut them to size on-suite in a kind of "tailor made" arrangement. In practice, it is not easy to reliably achieve a good finish when cutting e. g. perimeter rails to size, especially at corner elements which may require mitering. Pre-cut perimeter rails, with accurately generated mitering are preferred, though these then either limit the range of sizes which can be offered to a limited few standard length, or they require many different sizes to be offered as standard, increasing inventory cost and complexity. Moreover, in practice, ceiling systems can be laborious and time-consuming for technicians to set up especially when a good finish is to be achieved, in terms of size, alignment, robustness, functionality and aesthetics. Hence, in practice, there is tension between customers requirement for a well-assembled, pleasing and functional product and the suppliers wish to offer and deliver such systems based on only a few standard parts, to be produced in less cost intensive way.

It is therefore an object of the invention to provide a system for the construction of a sound insulation element to be arranged in a ceiling area of a building for example a suspended island ceiling system which is easy to build up and which is easy to be adapted to the client's order and which contains components being self-explaining how to be combined with other components to build up the system.

It is further object to provide a system allowing a high degree of flexibility concerning size and shape of an island ceiling system having an excellent finish e. g. at corner elements, being easy to fit and reaching an excellent finish is easy to achieve, while costs of producing are reduced, simplicity of installation is increased without decreasing flexibility or functionality and with low inventory levels.

Furthermore, it is an object of the invention to provide connecting elements for connecting of profile-elements of a sound insulation element to be arranged in a ceiling area of a building which can be produced easily and which can be used to connect profiles in a strong way thereby giving the connected profiles even in areas of edges a smooth outer appearance of a frame being build up by connecting profile elements.

Finally, it is an object of the invention to provide a connector for connecting a support profile to at least one profile element running perpendicular to the support profile in a sound insulation element to be arranged in a ceiling area of a building which can be used for different applications especially with respect to a use of different sound insulation panels which have to be arranged for example in different heights with respect to a frame of the system without using different connectors for different applications.

These objects, as well as others than will become apparent upon reference to the following detailed description and accompanying drawings, are achieved by a system providing a frame for a sound insulation panel to be inserted into the frame wherein components for constructing the frame are combined in a first assembly with the minimum required components for forming a closed frame and, if required, are combined in a second assembly of components for the extension of the length and/or width of the sound insulation element, and wherein both assemblies comprise connecting elements, in particular first and second connecting elements, and profile elements which are designed to be compatible with one another, the profile elements of the first and second as well as of any further assembly being identical in cross-section.

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The present invention offers the before named and even more advantages. In particular, it offers a small number of standard components which can be flexibly assembled to a wide range of sizes and shapes. The components are quick to assemble and its shapes are self-explanatory in use and installing in a way that gives pleasing and functional results.

Furthermore, the before-mentioned objects are achieved by connecting elements characterized by a first connecting element and a second connecting element each having connecting portions being arranged in mirror image and being insertable into the receptacles
5 in a form-locking and friction-locking manner.

Finally, the before-mentioned objects are achieved by a connector for connecting a support profile to at least one profile element running perpendicular to the support profile in a sound insulation element to be arranged in a ceiling area of a building which is essentially L-shaped
10 and thus having two legs, a first leg comprising a plate as an abutment against an inner surface of the profile element, which plate can be connected, in particular screwed, to the profile element, and a second leg having a receptacle which serves to receive a part of the support profile in a form-fitting manner.

15 Different aspects will be discussed. As will be understood these aspects overlap and can be combined with each other.

In one aspect a system for a construction of a sound insulation element to be arranged in a ceiling area of a building is disclosed. The system comprises a frame and a
20 sound insulation panel to be inserted into the frame.

The sound insulation panel can be formed of any suitable sound insulating material, for example mineral fibers bonded with binding agents.

25 The components for constructing the frame are combined in a first assembly with the minimum required components for forming a closed frame. The minimum required components comprise at least eight profile elements, where each profile element extending along a longitudinal axis between a mitered end face and a butting face. The mitered end face forms an angle to the longitudinal axis of between (not
30 including) 0° and 90° , preferable the angle is 45° which is a commonly used angle for providing a mitered assembly. The butting face forms an angle to the longitudinal axis of 90° .

The first assembly further comprise connecting elements, in particular first and second connecting elements each having connecting portions. The connecting portions are arranged in mirror image.

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The profile elements are designed to be compatible with one another. The profile elements of the first assembly are identical in cross-section and comprises at least two receptacles for inserting the connecting portions of the first and the second connecting elements.

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In another aspect of the invention the minimum number of components to build up a frame of a system for the construction of a sound insulation element to be arranged in a ceiling area of a building are combined in a first assembly which means that for example the first assembly contains eight profile elements and four first and four second connecting elements to connect the profile elements whereby the first connecting elements are used to connect the profile elements in areas of edges where the profile elements are arranged perpendicular to each other and the second connecting elements are used to connect adjacent profile elements running aligned to each other. The first assembly comprise only two types of profile elements to build up four corner elements and the connecting elements needed to connect the profile elements adjacent to each other, achieving a frame with a high degree of stability which can be used as an island system.

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As used herein, the term sound insulation element refers to elements such as acoustic tiles, which are used to manipulate the sound or propagation of sound. Thus, a sound insulation element can have acoustic insulating properties, acoustic absorbing properties and/or acoustic reflective properties. Other acoustic properties could also be provided in a sound insulation element with the intent to alter the sound as it interacts with the element.

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Additionally, the first assembly can be provided with hanging elements to be used to install the frame under the ceiling of the building in a certain distance to the ceiling. Such a ceiling may be a conventional ceiling, preferably made of concrete and arranged in a building defining an overhead boundary of a room. Nevertheless, a ceiling in the sense of the invention may be any overhead structure in a building being a closed or an open structure,

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such as a grid structure. Such an overhead structure may thereby constitute a carrying means for at least one sound insulation element. Alternatively, or additionally, such an overhead structure may be made of wood, resin or the like, and from which a sound insulation element can be suspended.

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If required, further components of the system are combined in a second assembly of components for the extension of the length or width of the sound insulation element which means that the second assembly at least contains two further profile elements which can be connected to two profile elements being corner elements of the first assembly thereby
10 prolonging the distance between two corners of the frame. If the frame of the system is to be prolonged in two directions running perpendicular to each other a further assembly can be combined with the first and the second assembly to build up a frame still having a square shape. Nevertheless, the combination of these three assemblies can also be used to build up a frame of a system having a rectangular but not square shape which means that one
15 side of the frame is longer than the side of the frame running perpendicular to the longer side.

In one embodiment the profile elements of the second assemblies extend along a longitudinal axis between two butting faces, where the butting faces forms angles to the
20 longitudinal axis of 90°.

The second and every further assembly of this kind contains two profile elements and two first connecting elements.

25 To incorporate a grid into the frame connectors for connecting a support profile of at least one profile element running perpendicular to the support profile in the sound insulation element are provided in a further assembly which can additionally contain at least one support profile to build up the grid.

30 Based on the different assemblies it is very easy to provide the necessary components of a sound insulation to a client according to the requirements of the client with respect to the length and width of the sound insulation element to be adapted to the ceiling even if the sound insulation element should cover the whole ceiling area in room or even if the sound insulation element should be a suspended island ceiling system.

The corner elements can be fixed together with the connecting elements. The further profile elements used as frame straights can be fixed to the corner element with insertable straight connecting elements. The profile elements can be cut from identical elongate profiles independent from being a frame straight or a part of a corner element. Bridging clips, so
5 called connectors between profile elements of the frame and runners, such as support profiles or cross-tees can be of the same single type and do not need a decision which type is to use at which place.

10 The connectors have special design features for quick, easy and precise installation and for robust connection between the profile elements of the frame and the support profiles or cross-tees. The frame straights and the profile elements forming a corner element do not have bosses for engagement with connecting elements so that these parts can be cut
15 anywhere along their length and are still capable of receiving the connecting elements into the end being cut.

According to a further embodiment of the invention the profile elements are substantially L-shaped in cross-section, have a first leg and a second leg, and both the first leg has a receptacle for a first connecting element and the second leg has a receptacle for a second
20 connecting element. The first and second connecting elements can be part of one single connector. Preferably, the connecting elements have connecting portions arranged in mirror image, each connecting portion being insertable into a receptacle in a form-locking and friction-locking manner. Thereby, one part of the connecting element being inserted in the first receptacle serves as anchor means whereas the second part of the connecting element
25 serves as aligning means. Both parts can be connected to each other and especially the anchor means is fixed by a screw running through the profile element into the connecting element.

Preferably the connecting portions of a connecting element are aligned with each other at
30 an angle of 90°. Such connecting elements can be used to connect two profile elements running perpendicular to each other. Of course, the connecting portions of a connecting element can be aligned with each other at an angle of 180° which means that the connecting portions are aligned in lengthwise direction. These connecting elements can be used to connect two profile elements being arranged aligned and adjacent to each other.

According to a further development of the invention two connecting elements connecting two profile elements are interconnected preferably via a plate member adapted to an end face of the profile elements and covering the end face. Such connecting elements can be preferably used in the area of two profile elements running together rectangular to each other and forming an edge of the frame. The plate member has the advantage that the plate member can equalize non exact cutting areas of the profile elements, especially in case of mitering and thereby giving the outer appearance of the profile a smooth body structure. Furthermore, the plate member can have a different color compared to the profile elements which can give further possibilities of an aesthetical appearance being visual in the outer shape of the frame.

Preferably, the profile element has, in the region of a receptacle, an opening for receiving a screw fixing the connecting element in the receptacle. A further embodiment is characterized in that the connecting elements are fixed to the profile element by a self-tapping screw. To have an opening for receiving the screw has the advantage that the fitting of the frame is simplified as someone building up the frame will notice to incorporate the screw into the opening and thereby to fix the connecting element with at least one profile element at an intended position.

According to a further embodiment of the invention the second assembly and/or a further assembly comprises at least one support profile which can be connected to oppositely arranged profile elements by means of two connectors to be arranged at the ends of the support profile. Preferable the two connectors are arranged at each of the ends of the support profile. With the support profile or several support profiles the grid within the frame can be easily build up thereby defining compartments into which sound insulation panels can be inserted.

The connector is preferably essentially L-shaped and thus has two legs first leg comprising a plate as an abutment against an inner surface of the profile element, which plate can be connected, in particular screwed, to the profile element, and a second leg having a receptacle which serves to receive a part of the support profile in a form-fitting manner. Preferably, the plate has a hole. In one embodiment the hole may be an elongated hole having two vertically standing narrow sides which are aligned horizontally with respect to the

profile element when arranged as intended. The two vertically extending narrow sides which are of identical V-shaped design, and markings, in particular grooves being arranged in a surface of the profile element, can be used for a precise installation and fixing of the connector to the profile element. The markings are located in the region of the inner surface
5 which extend in the direction of the longitudinal axis of the profile element and are arranged spaced from one another.

The markings on the profile element can be used for fixing the connector in different positions with respect to the height of the profile element so that the connectors can be used
10 for fixing the support profile depending on the sound insulation panels of different kinds in the compartments being build up by using the support profiles as a grid within the frame.

Thus, in one embodiment at least one marking, such as a groove or a notch as described can be formed on the inner surface of the profile element. The marking preferably extends
15 in the direction of the longitudinal axis of the profile element. The marking thus provides a guide for the installer to facilitate positioning of the connector on the profile element.

In a further embodiment, there are provided at least two markings on the profile element which are spaced from one another. Typically, the markings are spaced in a direction
20 transverse to the longitudinal axis of the profile element. As discussed, this facilitates positioning the connector in different heights on the profile element, and thus also arranges the support profile which supports the sound insulation panels in different heights. This provides a system which can be used for different sound insulation panels or can be an advantage if installing sound insulation panels having different thicknesses or different
25 coupling mechanisms such as edge profiles for engaging with the support profile. Of course, even more markings can be provided such as three, four or five. The number of markings can for example correlate with the number of different sound insulation tile which should be compatible with the system as described herein.

30 Preferably, the receptacle is U-shaped in cross-section and has a web, a first leg and a second leg, the first leg and the second leg being angled towards one another at their free ends in such a way that supports are formed for the part of the support profile to be received in the receptacle. The support profile has a corresponding profiling with respect to the receptacle so that the support profile is clamp-fitted within the receptacle. As the receptacle

has two open ends the connector can be moved along the support profile to reach a predetermined position on the support profile so that the connector can easily be connected to the profile of the frame. Differences in length of the support profiles can be settled by moving the connector along the support profile.

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Furthermore, the web has a spring element formed integrally with the connector which spring element is to be brought into contact to an upper surface of the support profile thereby fixing the connector in the predetermined position to the support profile in an additional friction-locking manner.

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According to a further development of the connector the first leg is formed to extend into an abutment plate before abutment against a side surface of the support profile, the abutment plate having two support elements aligned in the direction of the web and arranged spaced from one another. These support elements are in contact with the support profile thereby guiding the support profile in the predetermined position within the support profile. A spring element and the support elements cooperate to each other in guiding and holding the connector in a predetermined position with respect to the support profile so that the support profile is arranged in a predetermined position with respect to the sound insulation panels to be inserted into the compartments of the grid.

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Preferably, the connecting portions of the first connecting elements comprise a plurality of ribs, which are aligned parallel and in the same direction, the ribs being arranged tilted at an angle of between 30° and 60°, in particular of 45°, relative to the longitudinal axis of the connecting portion. Via the ribs the first connecting element is clamp-fitted within the receptacle in the profile element and the tilted arrangement of the ribs simplifies the movement of the first connecting element into the receptacle but hinders a movement of the first connecting element out of the receptacle.

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The ribs of the two connecting portions of a first connecting elements can be arranged tilted in opposite directions relative to the longitudinal axis of the connecting portions and thereby facilitate the movement of the connecting portions into one of two receptacles of two profile elements.

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Preferably, the connecting portions are formed of a support plate and of ribs arranged on

both surfaces of the support plate which makes it possible to use the same connecting portion for both receptacles of adjacent arranged profile elements.

5 The second connecting elements are preferably formed of a plate respectively having two regions of undulating shape along longitudinal sides and/or having two end faces in the shape of a segment of a circular arc. The shape of the second connecting elements simplifies the installation of the second connecting elements within the profile elements as lining element. Normally, the second connecting elements are inserted into one leg of the profile element being the leg having a shorter length compared to the length of the second
10 leg into which the first connecting element can be inserted having connecting portions as described before. The undulated shape along longitudinal sides allow to reduce the areas of contact to the side faces of the receptacles of the profile elements and thereby simplifies the arrangement of the second connecting element within the receptacle of the profile element. Of course, both connecting elements can be connected to a one piece connecting
15 element via a plate element even in the area of the connection of two profile elements being arranged aligned to each other.

According to a further development of the invention the first assembly additionally has connecting elements for connecting the profile elements at a building component, in
20 particular a ceiling of a building. Such connecting elements can be hanging loops which are connectable with one and to the profile element and with a second hand to a screw or the like being fixed in the ceiling, preferably together with a dowel. The connecting elements may be used as shear connection or just having a tensile strength like a rope, wire or cable used as hanging elements.

25 In another aspect, connecting elements for connecting of profile-elements of a sound insulation element to be arranged in a ceiling area of a building are subject of the invention whereby the profile elements are designed to be compatible with one another, being identical in cross-section having at least two receptacles for inserting a first and a second connecting
30 element. The first connecting element and the second connecting element each having connecting portions being arranged in mirror image and being insertable into the receptacles in a form-locking and friction-locking manner. As already described before such connecting elements have different advantages as well as the following description of preferred embodiments of the connecting elements of which the advantages are already described

before.

The connecting portions of each connecting element are aligned with each other at an angle of 90° so that these connecting portions can be inserted in receptacles of profile elements used as corner elements and being arranged adjacent to each other and incorporating an angle between their longitudinal axis being rectangular to each other. Of course, the connecting portions can also be aligned within each other at an angle of 180° so that these connecting portions can be used to connect two profile elements being arranged adjacent to each other and being arranged with their longitudinal axis in alignment.

A plate member may interconnect the first connecting element and the second connecting element both connecting two profile elements adjacent to each other, the plate member preferably being adapted to an end face of the profile elements adjacent to each other and covering the end faces of the profile element adjacent to each other. The plate member is therefore visible from outside the frame and may equalize small grooves in the end faces of the profile elements caused by a cutting or grinding or mitering process when the profile element formed as corner element having a mitered joint.

As the connecting elements being used to connect two profile elements being adjacent to each other maybe provided by an anchor means and lining means these connecting elements may be made from different materials for the connecting elements as for example the lining means may be preferably made from metal whereas the anchor means may be preferably made from resin.

In another aspect of the invention the connecting portions of a first connecting element comprise a plurality of ribs which are aligned parallel and in the same direction, the ribs being arranged tilted at an angle of between 30° and 60°, in particular of 45°, relative to the longitudinal axis of the connecting portion. The ribs of the two connecting portions of the first connecting element are arranged tilted in opposite directions relative to the longitudinal axis of the connecting portions. Preferably the connecting portions of the first connecting elements are formed of a support plate and of ribs arranged on both surfaces of the support plate. Such a connecting element simplifies the installation within the receptacle of the profile element on the one hand and on the other hand the design of the connecting portion with the ribs increases the flexibility of the connecting portion and achieves a tight fitting within

the receptacle of the profile element.

Preferably the second connecting element is formed of a plate respectively having two regions of undulating shape along longitudinal sides and/or having two end faces in the shape of a segment of a circular arc which on the one hand simplifies the installation of the second connecting element in the second receptacle of the profile element and which secures a safe fit of the second connecting element as lining means inside the receptacle.

According to a further aspect of the invention a connector for connecting a support profile to at least one profile element running perpendicular to the support profile in a sound insulation element to be arranged in a ceiling area of a building is main subject of the invention. Such a connector is part of an assembly according to the invention. Several connectors are known from the prior art for example from US 7,552,567 B2 showing such a connector being essentially L-shaped and thus having two legs, a first leg comprising a plate as an abutment against an inner surface of the profile element, which plate can be connected, in particular screwed to the profile element, and a second leg having a receptacle which serves to receive a part of the support profile in a form-fitting manner.

To provide such a connector which simplifies the connection of the connector to the support profile and/or the profile element with respect to different sound insulation panels, being for example different in thickness or being to be arranged in different installation heights, preferably in a predetermined position relatively to the support profile and/or the profile element, the invention is characterized in that the plate has an elongated hole having two vertically extending narrow sides which are aligned horizontally with respect to the profile element when arranged as intended, the two vertically extending narrow sides of which are of identical V-shaped design, and in that the profile element has markings, in particular grooves, in the region of the inner surface which extend in the direction to the longitudinal axis of the profile element and are arranged spaced from one another.

The plate of the connector is therefore equipped with an elongated hole.

The elongated hole has two vertically extending narrow sides which are aligned horizontally with respect to the profile element when arranged as intended is used to bring the connector in the intended arrangement to the profile element by using markings being provided at the

inner surface of the profile elements. For this reason, the narrow sides are of identical V-shaped design to evaluate a precise arrangement of the connector to the profile element before fixing the connector to the profile element by at least one screw to be inserted in an aperture within the plate of the connector and being screwed into the profile element.

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The plate may have a further notch being V-shaped and being in line with the identical V-shaped design of the narrow sides vertically extending of the elongated hole. The additional notch simplifies the exact arrangement of the connector with respect to the profile element as in this embodiment three positions are given to be brought in alignment with one marking

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of the profile element.

Additionally, a barb for grabbing into the profile element can be provided. The barb can for example be provided in the plate, of the connector where it extends in a direction opposite the second leg. The barb is especially suited for grabbing into the markings of the profile

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element and can for example be provided in the further notch. This barb may preferably be configured erecting into the direction of the profile element when the connector is arranged as intended. The barb can be used to be inserted into a recessed notch marking on the profile element surface. This may thereby facilitate locating and fixing of the connector in the intended position relative to the profile element. In fact, the barb, when engaged in the

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said notch marking, gives a first fixed position of the connector placed on the surface of the profile element. It may furthermore allow some movement of the connector around this first fixed position to find an exact alignment of the connector with respect to the markings before fixing the connector by a screw to be screwed through the connector into the profile element. The screw can run through the elongated hole and/or through a separate hole being

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arranged in the plate. Preferably, the barb has a triangular shape with a tip. The tip may be aligned with the aforementioned elongated hole. For example, in embodiments in which the elongated hole has two vertically extending narrow sides, each side being V-shaped, the said tip may align with the said v-shapes. Moreover, the barb and tip configuration may allow an easy grabbing into the material of the profile element or at least into the grooved

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marking. The barb gives a sort of tactile, positive engagement between the connector and the profile element. Thus, misalignment of the connector relative to the profile element can be avoided more easily compared to just using eyesight of aligning.

According to a further aspect of the invention the receptacle of the connector is U-shaped in

cross-section and has a web, a first leg and a second leg, the first leg and the second leg being angled toward one another at their free ends in such a way that supports are formed for the part of the support profile to be received in the receptacle. These supports guide the support profile within the receptacle when the connector is slid on the support profile in
5 lengthwise direction to a position being the intended position for fixing the connector to the profile element.

According to a further feature of the invention the web has a spring element formed integrally with a connector. This spring element is positioned to get into contact with an upper surface
10 of the support profile thereby keeping the support profile in a preferred position relative to the receptacle.

Finally, the first leg of the connector is formed to extend into an abutment plate for abutment against a side surface of the support profile, the abutment plate having two support elements
15 aligned in the direction of the web and arranged spaced from one another. The two support elements get into connection with a lower surface of the support profile to keep the support profile in a preferred position with respect to the receptacle so that the support profile is clamped fitted between the spring element and the two support elements of the abutment plate.

Further features and advantages of the invention are described in the following description of the drawings. In the drawings the following figures show:

Fig. 1 a systematic view on a system for a construction of a frame with components
25 being part of different assemblies;

Fig. 2 a first version of a sound insulation element with a frame in a top view;

Fig. 3 a second version of a sound insulation element with a frame in a top view;

Fig. 4 a third version of a sound insulation element with a frame in a top view;

Fig. 5 two profile elements for a frame according to one of the figures 1 to 4 to be
connected to a corner element,

- Fig. 6 the two profile elements according to figure 5 connected to each other and forming a corner of a frame according to one of the versions according to figures 1 to 4;
- 5 Fig. 7 a profile element in a perspective view;
- Fig. 8 a profile element according to figures 5 to 7 in a lateral view;
- 10 Fig. 9 a first connecting element in a perspective view;
- Fig. 10 the first connecting element according to figure 9 in a top view;
- Fig. 11 the first connecting element according to figures 9 and 10 in a side view;
- 15 Fig. 12 a second connecting element in a perspective view;
- Fig. 13 the second connecting element according to figure 12 in a side view;
- 20 Fig. 14 the connecting element according to figures 12 and 13 in a top view;
- Fig. 15 the second connecting element according to figures 12 to 14 in a frontal view;
- Fig. 16 two connecting elements as a one-piece connecting element in a first perspective view;
- 25 Fig. 17 the two connecting elements according to figure 16 in a second perspective view;
- Fig. 18 a second embodiment of two connecting elements as one-piece connecting element in a perspective view;
- 30 Fig. 19 a third embodiment of two connecting elements as one-piece connecting element in a perspective view;

- Fig. 20 two connecting elements as one-piece connecting element for connecting two profile elements in an edge area of the frame in perspective view;
- 5 Fig. 21 two profile elements to be connected with a connecting element in a perspective view;
- Fig. 22 the two profile elements according to figure 21 in connected manner in a perspective view;
- 10 Fig. 23 two profile elements to be connected with connecting elements according to figure 18 in a perspective view;
- Fig. 24 a connector for connecting a support profile to a profile element in a first perspective view;
- 15 Fig. 25 the connector according to figure 24 in a second perspective view;
- Fig. 26 the connector according to figures 24 and 25 in a side view;
- 20 Fig. 27 the connector according to figures 24 to 26 together with a profile in a frontal view;
- Fig. 28 a detail of the connector with the support profile according to circle B in figure 28;
- 25 Fig. 29 the connector according to figures 24 to 28 in a top view;
- 30 Fig. 30 a sheet metal to be used to form and bend the connector according to figures 24 to 29 in a top view; and
- Fig. 31 the connector of figures 24 to 29 fixed to the support profile and the profile element according to figures 7 and 8 in a perspective view.

Fig. 1 shows a system for a construction of a sound insulation element 100 (Figs. 2, 3 and 4) to be arranged in a ceiling area of a building. Such a system can be prepared to be used in a wall area of a building and main object of the system is to reduce and/or absorb sound waves in a room of a building. Of course, such a system can also be used in other rooms as for example on cruise ships, planes or the like.

Suppliers of such systems are frequently asked to provide or install them in a wide range of sizes, to adapt to particular spaces or needs. This can entail technicians who fit the systems to cut them to size on-side in a kind of tailor-made arrangement. In practice, it is not easy to reliably achieve a good finish when cutting e.g., parameter rails to size, especially at corner elements which may require mitering.

Fig. 1 shows a first assembly with a minimum required components for forming a closed frame 2 of a sound insulation element 100 according to Fig. 2. The first assembly 1 contains four corner elements 3, each comprising two profile elements 4 connected to each other via connecting elements 5 according to figures 20 to 21. The profile elements 4 are shown in figures 5, 6 and 8 in detail and will be described hereafter. Each profile element 4 of the first assembly 1 has an abutting face 6, such as a mitered end face as described herein, being aligned to a longitudinal axis of the profile element 4 at an angle of 45° . The abutting faces are produced by mitering one end face of the profile element 4.

In a rectangular shaped frame as the one shown in Figs. 2, 3 and 4, the corners form angle of 90° . Thus, as described the mitered end faces may advantageously form an angle as described of 45° such that they together form the 90° angled corner. However, if a pentagonal shape is desired instead of a rectangular shape the corners in an even cornered pentagon are 108° degrees. Thus, the angle of the mitered end faces forming the corners should be 54° . Thus, in one embodiment when the corner of a frame forms a corner angle of x° the mitered end faces should each have an angle of $(x/2)^\circ$.

The first assembly 1 additionally comprises connecting elements 7 and 8 to connect to profile elements 4 in the area of the abutting faces 9, such as butting faces as described herein. The butting faces 9 forms an angle to the longitudinal axis of the profile element of

90°. Additionally, four screws are components of the first assembly 1 which screws are used to be screwed through a wall element of the profile element 4 into the connecting element 8.

5 The components of the before described first assembly 1 are the necessary components to build up the frame 2 of the sound insulation element 100 according to Fig. 2. Fig. 2 additionally shows a grid 10 being part of the sound insulation element 100 which will be described hereafter.

10 The frame 2 is build up as a closed frame and can be used to insert sound insulation panels, not shown, made of for example mineral fibers bonded with binding agents.

To build up a frame 2 of a sound insulation element 100 according to Fig. 3 which has a greater length of two sides of the frame 2 or a frame 2 of a sound insulation element 100 according to Fig. 4 which has greater length and width of the frame 2 compared to the frame
15 2 of the sound insulation element 100 according to Fig. 2 a second assembly 11 according to Fig. 1 can be used with respect to the frame 2 of Fig. 3 or two second assemblies 11 according to Fig. 1 can be used to build up a frame 2 of a sound insulation element 100 according to Fig. 4.

20 Each second assembly 11 contains two profile elements 4, two connectors 8 and two connectors 7 as well as four screws. Compared to the profile elements 4 of the first assembly 1 the profile element 4 according to the second assembly 11 has two abutting faces 9 being parallel to each other. Or in other words, as described herein, the abutting faces are formed
25 as butting faces and forms an angle to the longitudinal axis of 90°.

These profile elements 4 are therefore profile elements 4 with rectangular shape and as can be seen in comparing Fig. 3 and Fig. 4 these profile elements 4 with rectangular shape can differ in length, which allows the variability of the assemblies 1 and 11 to build up a closed
30 frame 2 according to a client's requirements by using two assemblies 1 and 11.

Fig. 1 shows additional a third assembly containing twenty-five connectors 13 which are used to connect the grid 10 within the frame 2. The connectors 13 will be described hereafter. Additionally, fifty screws are components of the third assembly which are used to fix the

connectors 13 to profile elements 4 of the frame 2 and to a support profile 14 (figures 2 and 4) being part of the grid 10.

5 An additional fourth assembly 15 contains fixing elements 16 to connect the frame 2 to a ceiling (not shown) of a building. The arrangement of the fixing element 16 is shown in figures 2 and 3. The fixing elements 16 are fixed to profile elements 4 of two sides of the frame 2 running parallel to each other.

10 Fig. 6 shows a corner element 3 made from two profile elements 4 shown in Fig. 5 with mitered abutting faces 6 in a perspective view and the profile element 4 is shown more detailed in figures 7 and 8.

The profile element 4 according to figures 7 and 8 is substantially L-shaped in cross-section and has a first leg 17 and a second leg 18 running perpendicular to each other. The first leg 17 has a first receptacle 19 for inserting the connecting element 8 or a part of the connecting element 5. The first receptacle 19 has an opening having a square shape. The opening is defined by a first longitudinal wall 20 being part of the first leg 17 and a second longitudinal wall 21 running parallel to the first longitudinal wall 20 and having an outer surface 22 into which four markings in form of notches 23 are provided.

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The first longitudinal wall 20 and the second longitudinal wall 21 are connected via side walls 24 running parallel to each other and rectangular to the first longitudinal wall 20 and the second longitudinal wall 21.

25 The first receptacle 19 is arranged at the upper end of the first leg 17 which means in a certain distance to the second leg 18.

30 A second receptacle 25 is provided at the second leg 18 and defined by an undercut opening into which the connecting element 7 can be inserted with half of its length. The undercut opening is formed by two partition walls 69 being arranged aligned to each other. The first partition wall 69 is part of the first leg 17 erecting rectangular from the inner surface parallel to the second leg 18. The second partition wall 69 erects from a short leg 70 close to a free end of the second leg 18 in the direction towards the first partition wall 69.

A third receptacle 26 of the profile element 4 is provided above the first receptacle 19 by prolongations of the first longitudinal wall 20 and the second longitudinal wall 21 of the first receptacle 19 and being provided as undercut. The third receptacle 26 of the profile element can be used to integrate a part of the fixing element 16 into the receptacle 26.

5

Figures 9 to 11 show the connecting element 7 which is the connecting element 7 to be inserted into the second receptacle 25. The connecting element 7 is made from sheet metal having a thickness corresponding to the height of the undercut of the second receptacle 25 and a width corresponding to the width of the second receptacle 25, too.

10

The connecting element 7 has connecting portions 27 arranged in mirror image, each connecting portion 27 being insertable into a second receptacle 25 of one profile element 4 in a form-locking and friction-locking manner. The connecting element 7 being formed of a plate 28 has two parallel running longitudinal sides being connected via two end faces 29 in the shape of a segment of a circular arc which simplifies the insertion of the connecting element 27 into the second receptacle 25.

15

Both longitudinal sides 30 of the plate 28 have two regions of undulating shape along the longitudinal sides each region 31 having three protrusions 32 in the shape of a segment of a circular arc. To each protrusion 32 belong an opening 68 which increases the flexibility of the plate 28 in the area of the protrusions 32 simplifying the insertion of the connecting element 7 into the second receptacle 25 thereby increasing the connection of the connecting element 7 and the profile element 4 in friction-locking manner.

20

In figures 12 to 15 a first embodiment of the connecting element 7 is shown. The connecting element 7 is used to be inserted into the first receptacle 19 of the profile element 4.

25

The connecting element 8 has two connecting portions 33 each connecting portion 33 is intended to be inserted into the first receptacle 19 of one profile element 4 so that the connecting element 8 is finally fixed inside of two profile elements 4 being arranged adjacent to each other. Each connecting portion 33 comprises a plurality of ribs 34 being arranged tilted at an angle of 30° relative to a longitudinal axial of the connecting portion represented by a plate 35 running lengthwise through the whole connecting element 8. A second plate 36 is arranged in a horizontally aligned mid plane of the connecting element 8. The ribs 34

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are arranged above and underneath the second plate 36 whereby the ribs 34 can erect in different directions above and underneath of the plate 36 and/or in the areas of both connecting portions 33 to be inserted into two profile elements 4.

The connecting element 8 is made from resin and has especially in the area of the ribs 34 a certain elasticity. The connecting element 8 has a height being identical to an inner height of the first receptacle 19. The width of the connecting element 8 may be a little bit bigger than an inner width of the first receptacle 19 so that the connecting element 8 is clamp fitted in the first receptacle 19. Additionally, the connecting element 8 can be fixed by using one screw in each profile element running through the second longitudinal wall 21 of the first receptacle 19 into the connecting element 8 as it is been shown in figures 23 and 24 with respect to a corner element 3 of the frame 2.

The connecting elements 7 and 8 as shown in figures 10 to 15 are two parts being used as a lining means in form of the connecting element 7 and as an anchor means in form of the connecting element 8.

Figures 16 to 19 show different embodiments of a single-part connecting element 37 comprising a connecting element 7 and a connecting element 8 connected via a connector plate 38. The connector plate 38 is provided with a rear surface 39 being visible between two profile elements 4 to be connected via the connecting element 37. Furthermore, the connector plate 38 is provided with an inner plate 40 erecting on both sides of the connector plate 38 and being running rectangular to the connector plate 38 and parallel to the direction of the connecting element 8. This inner plate 40 as abutment plate comes into attachment with an inner surface 41 of the first receptacle 19 of the profile element 4. The inner plate 40 stabilizes the adjustment of the connecting element 37 in the first receptacles 19 of the profile elements 4 being arranged adjacent to each other.

The inner plate 40 extends mostly over the distance between the connecting element 7 and the connecting element 8 and has according to the embodiment of figure 18, described in the following, a length approximately equal to the length of the connecting element 7. In an area of a connection of the inner plate 40 with the connector plate 38 two stiffening members 42 are connected to the inner plate 40 and the connector plate 38 in that the stiffening members 42, the connector plate 38 and the inner plate 40 are one single part.

In an area of a footbridge 72 a groove 73 is provided into which groove 73 the partition wall 69 being part of the first longitudinal wall 20 joins in.

- 5 The connecting element 7 is provided as a platelike element 74 having a protruding rim 75, which is arranged under the partition wall 69 being part of the leg 70.

Figure 18 shows a second embodiment of the connecting element 37 differing from the embodiment according to figures 16 and 17 by the additional stiffening members 42 being
10 provided at an inner surface 43 of the inner plate 40 and running from the connector plate 38 in a direction to an outside of the inner plate 40 and having a triangular cross section. Furthermore, the inner plate 40 is connected to a further stiffening element 44 in the area of the footbridge 72 connecting the inner plate 40 with a plate 45 being fixed to the connecting element 7 thereby stiffening the connecting element 7.

15

A further embodiment of the connecting element 37 is shown in Fig. 19 which differs from the embodiment according to Fig. 18 in the shape of plate 45 which has in the embodiment according to Fig. 19 two end faces in the shape of a segment of a circular arc.

- 20 In the embodiment according to figure 19 the plate 45 is shorter than the connecting element 7.

Figure 20 shows a further connecting element 46 which is comparable to the embodiments of the connecting elements 37 in figures 16 to 19 with the difference that the connecting
25 portions 33 are aligned with each other at an angle of 90° to be used for a connection of two profiles 4 as a corner element 3 according to figure 6. Both portions 33 of the connecting element 8 have outer ribs 34.1 being thicker than the ribs 34 to increase the rigidity of the connecting element 8.

- 30 Figures 21 to 23 show a part of the frame 2 whereby figures 21 shows the situation before connecting two profile elements 4 and whereby figures 22 and 23 show the situation after the profile elements 4 are finally connected to each other. Figures 21 and 22 show the connection of two profile elements 4 as corner element 3 whereas figure 23 shows the connection of two profile elements 4 being arranged in line to each other. As can be seen

from figure 21 screws are used to fix the connecting element 8 in both receptacles 19 of two profile elements 4 being arranged adjacent to each other.

Finally, figures 24 to 30 show a connector 47 in different views and Fig. 31 shows the use
5 of the connector 47 to connect the support profile 14 to the profile element 4.

The connector 47 is made from a sheet metal which is stamped out from a sheet panel in a shape according to Fig. 30 and is brought into the shape of the connector 47 according to Fig. 24 by bending along lines A to G in Fig. 30.

10 The connector 47 is essentially L-shaped as can be seen from Fig. 24. Therefore, the connector 47 has two legs 48, 49 whereby the first leg 48 comprises a plate 50 as an abutment against the surface 22 of the profile element 4. The plate 50 can be connected to the profile element 4 by using a screw (not shown) running through a circular opening 51 or
15 an elongated hole 52 having two vertically extending narrow sides which are aligned horizontally with respect to the profile element 4 when arranged as intended, the two vertically extending narrow sides of which are of identical V-shaped design. To fix the connector 47 in the intended arrangement to the profile element 4 the notches 23 being arranged on the surface 22 of the profile element 4 are brought into alignment with the V-shaped narrow sides of the hole 52 before screwing the connector 47 to the profile element
20 4. Preferably, two screws are used to reach a better fixing of the connector 47 at the profile element 4 which fixing is a form-locking fixing so that a movement of the connector 47 relatively to the profile element is precluded.

25 A further means for finding the exact and intended position of the connector 47 relatively to the profile element is a further notch 53 being arranged in a side face 54 of the plate 50 and being aligned with the two identical V-shaped narrow sides of the elongated hole 52.

30 Additionally, a barb 71 for grabbing into the profile element 4, namely into one of the notches 23 of the profile element 4 is provided in the notch 53 of the plate 50. The barb 71 erects into the direction of the profile element 4 when the connector 47 is arranged as intended. The barb 71 is used to be inserted into one of the notches 53 as a marking thereby facilitating the fixing of the connector 47 in the intended position relative to the profile element 4. In fact, the barb 71 gives a first fixed position of the connector 47 placed on the surface 22 of the

profile element 4. It may allow to move the connector 47 around this first fixed position to find an exact alignment of the connector 47 with respect to the notches 53. This may be useful e.g. before fixing the connector 47 by at least one screw to be screwed through the connector 47 into the profile element 4. The screw can run through the elongated hole 52 and/or through the separate hole 51 being arranged in the plate 50. Preferably, the barb 71 has a triangular shape with a tip being aligned with the two vertically extending narrow sides of the elongated hole 52. The sides of this elongated hole 52 may have V-shaped design and may preferably allow easy grabbing into the material of the profile element 4 or at least into the groove 53 representing the marking. The barb 71 can give a sort of tactile, positive engagement between the connector 47 and the profile element 4. Thus, misalignment of the connector 47 relative to the profile element 4 can be avoided more easily compared to just using eyesight of aligning.

In a connecting area between the first leg 48 and the second leg 49 an embossing 74 is provided to give the connector 47 a higher rigidity.

The second leg 49 of the connector 47 has a receptacle 55 which serves to receive a part of the support profile 14 in a form-fitting manner.

The receptacle 55 is U-shaped in cross-section and has a web 56 and a first leg 57 and a second leg 58. The first leg 57 and the second leg 58 are angled towards one another at their free ends in such a way that supports 59 are formed for a part 65 of the support profile 14 to be received in the receptacle 55.

The web 56 has a spring element 60 formed integrally with the connector 47. The first leg 57 is formed to extend into an abutment plate 61 for abutment against a side surface 62 of the support profile 14 (Fig. 31), the abutment plate 61 having two support elements 63 aligned in the direction to the web 56 and arranged spaced from one another. These support elements 63 carry the part 65 of the support profile 14 so that the support profile 14 is clamped between the support elements 63 and the spring element 60.

A connecting area between the first leg 57 and the abutment plate 61 may be provided with one or more embossings. These may provide rigidity to the connector 47, in particular these may reinforce, give rigidity to, and thereby maintain an angle between the first leg 57 and

the abutment plate 61 when the connector 47 is fixed to the support profile 14.

As can be seen from Fig. 26 the spring element 60 is arranged in an opening 64 of the second leg 49 of the connector 47. The opening 64 is designed window-like through which
5 a part 65 of the support profile 14 is visible from outside. The part 65 has the design of a box section in cross-section which has external dimensions fitting into the internal dimensions of the receptacle 55 to be held in a form-locking and friction-locking manner inside the receptacle 55.

10 The abutment plate 61 is provided with a circular opening 66 and an elongated hole 67 both to be provided for receiving a screw with which the connector 47 may be fixed to the support profile 14.

Reference list

	1	first assembly
	2	frame
5	3	corner element
	4	profile element
	5	connecting element
	6	abutting face
	7	connecting element
10	8	connecting element
	9	abutting face
	10	grid
	11	second assembly
	12	third assembly
15	13	connector
	14	support profile
	15	fourth assembly
	16	fixing element
	17	first leg
20	18	second leg
	19	first receptacle
	20	first longitudinal wall
	21	second longitudinal wall
	22	surface
25	23	notch
	24	side wall
	25	second receptacle
	26	receptacle
	27	connecting portion
30	28	plate
	29	end face
	30	longitudinal side
	31	region
	32	protrusion

	33	portions
	34	rib
	34.1	outer rib
	35	plate
5	36	plate
	37	connecting element
	38	connector plate
	39	surface
	40	inner plate
10	41	inner surface
	42	stiffening member
	43	inner surface
	44	stiffening element
	45	plate
15	46	connecting element
	47	connector
	48	first leg
	49	second leg
	50	plate
20	51	opening
	52	hole
	53	notch
	54	side face
	55	receptacle
25	56	web
	57	first leg
	58	second leg
	59	support
	60	spring element
30	61	abutment plate
	62	side surface
	63	support element
	64	opening
	65	part

- 66 opening
- 67 hole
- 68 opening
- 69 partition wall
- 5 70 leg
- 71 barb
- 72 footbridge
- 73 groove
- 74 embossing
- 10 75 rim
- 100 sound insulation element

- A line
- B line
- 15 C line
- D line
- E line
- F line
- G line

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Embodiments:

1. System for a construction of a sound insulation element to be arranged in a ceiling area of a building, consisting of a frame (2) and a sound insulation panel to be inserted into the frame (2), in particular of mineral fibers bonded with binding agents, wherein components for constructing the frame (2) are combined in a first assembly (1) with the minimum required components for forming a closed frame (2) and, if required, are combined in a second assembly (11) of components for the extension of the length and/or width of the sound insulation element, and wherein both assemblies (1; 11) comprise connecting elements (7, 8), in particular first and second connecting elements (7, 8), and profile elements (4) which are designed to be compatible with one another, the profile elements (4) of the first and second as well as of any further assembly (1; 11; 12) being identical in cross-section.
2. System according to embodiment 1, characterized in that the profile elements (4) are substantially L-shaped in cross-section, have a first leg (17) and a second leg (18), and both the first leg (17) has a receptacle (19) for a first connecting element (8) and the second leg (18) has a receptacle (25) for a second connecting element (7).
3. System according to embodiment 1 or 2, characterized in that the connecting elements (7, 8) have connecting portions (27, 33) arranged in mirror image, each connecting portion (27, 33) being insertable into a receptacle (19, 25) in a form-locking and friction-locking manner.
4. System according to embodiment 3, characterized in that the connecting portions (27, 33) of a connecting element (7, 8) are aligned

with each other at an angle of 90°.

5. System according to embodiment 1, 2 or 3,
characterized in that
5 two connecting elements (7, 8) connecting two profile elements (4) are
interconnected, preferably via a plate member (40) adapted to an end face of
the profile elements (4) and covering the end face.
6. System according to embodiment 2,
10 characterized in that
the profile element (4) has, in the region of a receptacle (19), an opening for
receiving a screw fixing the connecting element (8) in the receptacle (19) or
in that the connecting element (8) is fixed to the profile element (4) by a self-
tapping screw.
15
7. System according to any one of the embodiments 1 – 6,
characterized in that
the second assembly (11) and/or a further assembly (12) comprises at least
one support profile (14) which can be connected to oppositely arranged profile
20 elements (4) by means of two connectors (47) to be arranged at the ends of
the support profile (14).
8. System according to embodiment 7,
characterized in that
25 the connector (47) is essentially L-shaped and thus has two legs (48, 49), a
first leg (48) comprising a plate (50) as an abutment against an inner surface
(22) of the profile element (4), which plate can be connected, in particular
screwed, to the profile element (4), and a second leg (49) having a receptacle
(55) which serves to receive a part (65) of the support profile (14) in a form-
30 fitting manner.

9. System according to embodiment 8,
characterized in that
the plate (50) has an elongated hole (52) having two vertically extending
narrow sides which is aligned horizontally with respect to the profile element
5 (4) when arranged as intended, the two vertically extending narrow sides of
which are of identical V-shaped design, and in that the profile element (4) has
markings, in particular notches or grooves (23), in the region of the inner
surface (22) which extend in the direction of the longitudinal axis of the profile
element (4) and are arranged spaced from one another.
10. System according to embodiment 8 or 9,
characterized in that
the receptacle (55) is U-shaped in cross-section and has a web (56) and a
first leg (57) and a second leg (58), the first leg (57) and the second leg (58)
15 being angled towards one another at their free ends in such a way that
supports (59) are formed for the part (65) of the support profile (14) to be
received in the receptacle (55).
11. System according to embodiment 10,
20 characterized in that
the web (56) has a spring element (60) formed integrally with the connector
(47).
12. System according to embodiment 10 or 11,
25 characterized in that
the first leg (57) is formed to extend into an abutment plate (61) for abutment
against a side surface (62) of the support profile (14), the abutment plate (61)
having two support elements (63) aligned in the direction of the web (56) and
arranged spaced from one another.
13. System according to embodiment 3,

characterized in that
the connecting portions (33) of the first connecting elements (8) comprise a plurality of ribs (34) which are aligned parallel and in the same direction, the ribs (34) being arranged tilted at an angle of between 30° and 60°, in particular
5 of 45°, relative to the longitudinal axis of the connecting portion (8).

14. System according to embodiment 13,
characterized in that
the ribs (34) of the two connecting portions (33) of a first connecting element
10 (8) are arranged tilted in opposite directions relative to the longitudinal axes of the connecting portions (33).

15. System according to embodiment 13 or 14,
characterized in that
15 the connecting portions (33) are formed of a support plate (35, 36) and of ribs (34) arranged on both surfaces of the support plate (35, 36).

16. System according to any one of the embodiments 1 – 15,
characterized in that
20 the second connecting elements (7) are formed of a plate (28) respectively having two regions of undulating shape along longitudinal sides and/or having two end faces (29) in the shape of a segment of a circular arc.

17. System according to any one of the embodiments 1 – 16,
characterized in that
25 the first assembly (1) additionally has connecting elements for connecting the profile elements (16) at a building component, in particular a ceiling of a building.

18. Connecting elements for connecting of profile elements (4) of a sound
30 insulation element to be arranged in a ceiling area of a building whereby the

profile elements (4) are designed to be compatible with one another, being identical in cross-section and having at least two receptacles (19, 25) for inserting a first and a second connecting element (7, 8),

characterized by

5 a first connecting element (8) and a second connecting element (7) each having connecting portions (27, 33) being arranged in mirror image and being insertable into the receptacles (19, 25) in a form-locking and friction-locking manner.

10 19. Connecting elements according to embodiment 18, characterized in that the connecting portions (27, 33) of each connecting element (7, 8) are aligned with each other at an angle of 90°.

15 20. Connecting elements according to embodiment 18 or 19, characterized in that a plate member (38) interconnects the first connecting element (8) and the second connecting element (7) both connecting two profile elements (4) adjacent to each other, the plate member (38) preferably being adapted to an
20 end face of the profile elements (4) adjacent to each other and covering the end faces of the profile elements (4) adjacent to each other.

21. Connecting elements according to embodiment 18, 19 or 20, characterized by
25 different materials for the connecting elements (7, 8) connecting two profile elements (4) adjacent to each other.

22. Connecting elements according to embodiment 18, 19, 20 or 21, characterized in that

the connecting portions (33) of a first connecting element (8) comprise a plurality of ribs (34) which are aligned parallel and in the same direction, the ribs (34) being arranged tilted at an angle of between 30° and 60°, in particular of 45°, relative to the longitudinal axis of the connecting portion (33).

5

23. Connecting elements according to embodiment 22, characterized in that the ribs (34) of the two connecting portions (33) of the first connecting element (8) are arranged tilted in opposite directions relative to the longitudinal axes of the connecting portions (33).

10

24. Connecting elements according to embodiment 22 or 23, characterized in that the connecting portions (33) of the first connecting element (8) are formed of a support plate (35, 36) and of ribs (34) arranged on both surfaces of the support plate (35, 36).

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25. Connecting elements according to any one of the embodiments 18 – 23, characterized in that the second connecting element (7) is formed of a plate (28) respectively having two regions of undulating shape along longitudinal sides and/or having two end faces (29) in the shape of a segment of a circular arc.

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26. Connector for connecting a support profile (14) to at least one profile element (4) running perpendicular to the support profile (14) in a sound insulation element to be arranged in a ceiling area of a building, being essentially L-shaped and thus having two legs (48, 49), a first leg (48) comprising a plate (50) as an abutment against an inner surface (22) of the profile element (4), which plate (50) can be connected, in particular screwed, to the profile element (4), and a second leg (58) having a receptacle (55) which serves to receive a part (65) of the support profile (14) in a form-fitting manner

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characterized in that

the plate (50) has an elongated hole (52) having two vertically extending narrow sides which is aligned horizontally with respect to the profile element (4) when arranged as intended, the two vertically extending narrow sides of which are of identical V-shaped design, and in that the profile element (4) has markings, in particular grooves (23), in the region of the inner surface (22) which extend in the direction of the longitudinal axis of the profile element (4) and are arranged spaced from one another.

27. Connector according to embodiment 26, characterized in that the receptacle (55) is U-shaped in cross-section and has a web (56) and a first leg (57) and a second leg (58), the first leg (57) and the second leg (58) being angled towards one another at their free ends in such a way that supports (59) are formed for the part (65) of the support profile (14) to be received in the receptacle (55).
28. Connector according to embodiment 27, characterized in that the web (56) has a spring element (60) formed integrally with the connector (47).
29. Connector according to embodiment 27 or 28, characterized in that the first leg (57) is formed to extend into an abutment plate (61) for abutment against a side surface (62) of the support profile (14), the abutment plate (61) having two support elements (63) aligned in the direction of the web (56) and arranged spaced from one another.

Claims:

1. System for a construction of a sound insulation element to be arranged in a ceiling area of a building, comprising a frame (2) and a sound insulation panel to be inserted into the frame (2), in particular of mineral fibers bonded with binding agents, wherein components for constructing the frame (2) are combined in a first assembly (1) with the minimum required components for forming a closed frame (2) and, wherein the minimum required components comprises at least eight profile elements (4), each profile element extending along a longitudinal axis between a mitered end face and a butting face, wherein the mitered end face forms an angle to the longitudinal axis of between 0° and 90° and the butting face forms an angle to the longitudinal axis of 90° , wherein the first assembly further comprise connecting elements (7, 8), in particular first and second connecting elements (7, 8) each having connecting portions (27, 33) being arranged in mirror image, and where the profile elements (4) are designed to be compatible with one another, and the profile elements (4) of the first assembly (1) being identical in cross-section and comprises at least two receptacles (19, 25) for inserting the connecting portions (27, 33) of the first and the second connecting elements (7, 8).
2. System according to claim 1, comprising a second assembly (11) of components for the extension of the length and /or width of the sound insulation element.
3. System according to claim 2, wherein the components of the second assembly comprise at least two profile elements extending along a longitudinal axis between two butting faces, where the butting faces forms angles to the longitudinal axis of 90° .
4. System according to claim 2 or 3, wherein both assemblies (1; 11) comprise connecting elements (7, 8) in particular first and second connecting elements

(7, 8) and profile elements (4) which are designed to be compatible with one another, the profile elements (4) of the first and second as well as of any further assembly (1; 11; 12) being identical in cross-section.

- 5 5. System according to any one of the claims 1 – 4, wherein the connecting portions (27, 33) of at least some of the connecting elements (7, 8) are aligned with each other at an angle of 90°.
- 10 6. System according to any one of the claims 1 – 5, wherein the connecting portions (27, 33) of at least some of the connecting elements (7, 8) are aligned with each other at an angle of 180°.
- 15 7. System according to any one of the claims 1 - 6, characterized in that the profile elements (4) are substantially L-shaped in cross-section, have a first leg (17) and a second leg (18), and wherein the first leg (17) comprises the receptacle (19) for the first connecting element (8) and the second leg (18) comprises the receptacle (25) for the second connecting element (7).
- 20 8. System according to any one of the claims 1 - 7, characterized in that each connecting portion (27, 33) being insertable into a receptacle (19, 25) in a form-locking and/or friction-locking manner.
- 25 9. System according to any one of the claims 1 – 8, characterized in that two connecting elements (7, 8) connecting two profile elements (4) are interconnected, preferably via a plate member (40) adapted to an end face of the profile elements (4) and covering the end face.
- 30 10. System according to any one of the claims 1 – 9,

characterized in that
the profile element (4) has, in the region of the receptacle (19), an opening for
receiving a screw fixing the connecting element (8) in the receptacle (19) or
in that the connecting element (8) is fixed to the profile element (4) by a self-
tapping screw.

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11. System according to any one of the claims 1 – 10,
characterized in that
the first assembly (1), the second assembly (11) and/or a further assembly
(12) comprises at least one support profile (14) which can be connected to
oppositely arranged profile elements (4) by means of two connectors (47) to
be arranged at the ends of the support profile (14).

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12. System according to claim 11,
characterized in that
the connector (47) is essentially L-shaped and thus has two legs (48, 49), a
first leg (48) comprising a plate (50) as an abutment against an inner surface
(22) of the profile element (4), which plate can be connected, in particular
screwed, to the profile element (4), and a second leg (49) having a receptacle
(55) which serves to receive a part (65) of the support profile (14) in a form-
fitting manner.

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13. System according to claim 12, wherein the plate (50) comprises a hole (52).

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14. System according to claim 13,
characterized in that
the hole is an elongated hole (52) having two vertically extending narrow sides
which is aligned horizontally with respect to the profile element (4) when
arranged as intended, the two vertically extending narrow sides of which are
of identical V-shaped design.

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15. System according to claim 12, 13 or 14, wherein the plate (50) comprises a barb (71) extending from the plate in a direction opposite the second leg (49).
16. System according to any one of the claims 1 – 14, wherein the profile element
5 (4) has at least one marking, in particular a notch or a groove (23), in the region of the inner surface (22) which extend in the direction of the longitudinal axis of the profile element (4).
17. System according to claim 16, wherein the profile element (4) comprises at
10 least two markings, in particular notches or grooves (23), which are arranged spaced from one another.
18. System according to claim 17, wherein the at least two markings, in particular notches or grooves (23), are arranged spaced from each other in a direction
15 transverse to the longitudinal axis of the profile element (4).
19. System according to any one of the claims 12 – 18,
characterized in that
the receptacle (55) is U-shaped in cross-section and has a web (56) and a
20 first leg (57) and a second leg (58), the first leg (57) and the second leg (58) being angled towards one another at their free ends in such a way that supports (59) are formed for the part (65) of the support profile (14) to be received in the receptacle (55).
- 25 20. System according to claim 19,
characterized in that
the web (56) has a spring element (60) formed integrally with the connector (47).
- 30 21. System according to claim 19 or 20,
characterized in that

the first leg (57) is formed to extend into an abutment plate (61) for abutment against a side surface (62) of the support profile (14), the abutment plate (61) having two support elements (63) aligned in the direction of the web (56) and arranged spaced from one another.

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22. System according to any one of the claims 1 – 21,
characterized in that
the connecting portions (33) of the first connecting elements (8) comprise a plurality of ribs (34) which are aligned parallel and in the same direction, the
10 ribs (34) being arranged tilted at an angle of between 30° and 60°, in particular of 45°, relative to the longitudinal axis of the connecting portion (8).

23. System according to claim 22,
characterized in that
15 the ribs (34) of the two connecting portions (33) of a first connecting element (8) are arranged tilted in opposite directions relative to the longitudinal axes of the connecting portions (33).

24. System according to claim 22 or 23,
20 characterized in that
the connecting portions (33) are formed of a support plate (35, 36) and of ribs (34) arranged on both surfaces of the support plate (35, 36).

25. System according to any one of the claims 1 – 24,
25 characterized in that
the second connecting elements (7) are formed of a plate (28) respectively having two regions of undulating shape along longitudinal sides and/or having two end faces (29) in the shape of a segment of a circular arc.

30 26. System according to any one of the claims 1 – 25,
characterized in that

the first assembly (1) additionally has connecting elements for connecting the profile elements (16) at a building component, in particular a ceiling of a building.