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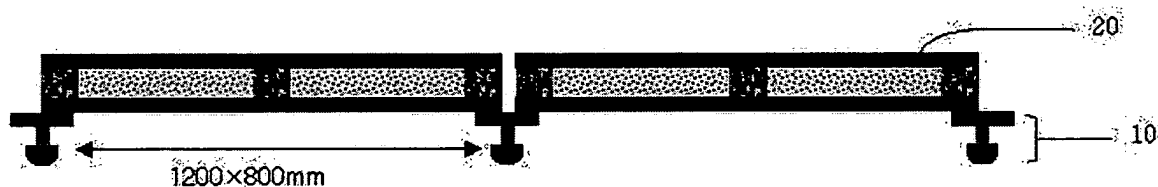
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(54) **Access floor system comprising sandwich boards**

(57) An access floors for reducing floor impact sound. The access floor system includes a plurality of supports (10) disposed at regular intervals, and upper plates (20) placed on the supports, each of the upper plates including an upper board (21), a lower board (22), and a quadrangular reinforcing frame (23) disposed between the upper board and the lower board. By employing the high rigidity sandwich upper plate, the upper plate can be light and the interval between the supports

can be widened in comparison with the conventional access floor system, so that the floor impact sound reduction effect is enhanced. Since sound absorbing material or head insulation material is inserted between the reinforcing members, the sound absorption performance or the heat insulation performance can be enhanced. More particularly, the floor impact sound in apartments is absorbed so that comfortable environment without noise can be realized.

Fig. 2



Description**BACKGROUND OF THE INVENTION****Field of the Invention**

[0001] The present invention relates to dry-type sound insulation access floors, and more particularly to dry-type sound insulation access floors having a high rigidity sandwich board in which time and cost for installing the access floors are reduced, and floor impact sound is reduced.

Description of the Related Art

[0002] In Korea, in order to wire and/or install a conduit system in the room, such as an office, a computer room, a factory for electronic Information Technology products, as shown in Fig. 1a, a conventional access floor is basically constructed such that supports 10' are arranged at regular intervals, and access floor upper plates 20' are placed on the supports 10', such that spaces equal to the height and interval of the supports 10 are defined. Since this access floor must be designed to endure a relatively heavy load, rigid materials such as steel supports 10' and inorganic upper plates 20' are used, so that relatively high weight materials are required, and the interval between the supports 10' is about 500×500 mm, or 600×600 mm. Thus, the installation of the access floor is not efficient and time for installing the access floor depends on the skill of the installer.

[0003] Moreover, in Japan, when access floors are installed in apartments, it is a main object to install lower a conduit system, and to reduce light floor impact sound. According to the access floor installed in Japan, heavy floor impact sound as a matter of concern in Korea is reduced just a little, but may be increased dependent on the ability of installing the access floor in various buildings. Further, in order to maximize reduction of the floor impact sound, non-elastic rubber is used, but the non-elastic rubber causes fluctuation of the access floor when walking thereon, so that walkers accustomed to rigid cement/mortar floor feel uneasiness.

[0004] According to the conventional dry-type sound insulation access floor used in Japan, as shown in Fig. 1b, a plurality of supports 10 " are arranged on a concrete floor at regular intervals, and a plurality of upper plates 20" are placed on the supports 10".

[0005] The longer the interval between the supports 10 " is, i.e. the less the number of the supports 10" is, the smaller the number of times for adjusting the level of the floor is, so that the access floor is rapidly installed and cost for the support 10" is reduced. However, if the interval between the supports 10" is increased, the floor is fluctuated and deflected when walking due to deterioration of rigidity, so that the maximum interval between the supports 10" in the conventional access floor is 600×455 mm.

[0006] Moreover, since the conventional upper plate 20" consists of unmodified particleboard, it is difficult to reduce the floor impact sound, and the heavy weight of the upper plates 20" themselves serve as a large of load to the supports 10".

SUMMARY OF THE INVENTION

[0007] Therefore, the present invention has been made to provide a noise proof system between floors capable of remarkably reducing light floor impact sound and heavy floor impact sound and having excellent proof load performance in view of the above problems, and it is an object of the present invention to provide a house access floor system capable of solving the deflection of access floor members caused by longer intervals between supports while widening the interval between supports.

[0008] It is the other object of the present invention to provide a house access floor system of which sound absorption or heat insulation performance and the fluctuation when walking thereon are improved so as to allow comfortable environment.

[0009] In accordance with an aspect of the present invention, the above and other objects can be accomplished by the provision of an access floor system including a plurality of supports disposed at regular intervals, and upper plates placed on the supports, each of the upper plates including an upper board, a lower board, and a quadrangular reinforcing frame disposed between the upper board and the lower board.

[0010] The upper board, the lower board, and the reinforcing member can be made of single or complex material using at least two materials selected from wood, inorganic material, synthetic resin, steel, and aluminum, preferably wood, taking into consideration of the rigidity in comparison with cost and the easiness for manufacturing. More particularly, the reinforcing member is multi-ply wood.

[0011] Preferably, the total thickness of each of the upper plates including the upper board, the lower board, and the reinforcing member ranges from 20 to 70 mm. If the thickness is too low, the desired rigidity cannot be obtained, and

if the thickness is too high, the load and material cost of the upper plate itself are increased.

[0012] According to the preferred embodiment of the present invention, for the purpose of sound absorption or heat insulation and high rigidity of the upper plate, sound absorbing material or heat insulation material can be inserted between the reinforcing members.

[0013] The sound absorbing material or the heat insulation material may include a synthetic fiber selected from the group of glass wool, rock wool, and polyethylene terephthalate, or a plastic foam selected from the group of expanded polystyrene, foamed urethane, and foamed polyvinyl chloride (PVC).

[0014] By employing the high rigidity sandwich upper plate in the present invention, the interval between the supports is to at least 400×400 mm, preferably, larger than 600×600 mm, more preferably in the range from 600×600 mm to 1,200×1,800 mm. The access floor system according to the present invention is advantageous in that it reduces floor impact sound and can achieve a light upper plate.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1a is a structural view illustrating a conventional commercial house access floor used in Korea;

Fig. 1b is a structural view illustrating a conventional house access floor used in Japan;

Fig. 2 is a structural view illustrating an access floor according to the present invention;

Fig. 3 is a cross-sectional view and a partially exploded plan view illustrating an upper plate according to a preferred embodiment of the present invention;

Fig. 4 is a cross-sectional view and a partially exploded plan view illustrating an upper plate according to another preferred embodiment of the present invention;

Fig. 5 is a reference view illustrating a method for measuring the deflection of the upper plate; and

Fig. 6 is a graph comparing performance for reducing heavy floor impact sound of a conventional office upper panel, a conventional house upper panel, and a high rigidity upper panel according to the present invention, which are employed in the access floor.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] Hereinafter, a house access floor system according to the present invention will be described in detail with reference to the accompanying drawings.

[0017] Fig. 2 shows a house access floor system according to the present invention, which includes a plurality of supports 10 arranged at regular intervals and a plurality of upper plates 20 placed on the supports 10.

[0018] In the present invention, high rigidity sandwich upper plates are used as the upper plates 20 and may be arranged in intervals between the supports more than at least 400×400 mm, for example, 600×600 mm, 900×900 mm, 800×1,200 mm, 1,200×1,200 mm, or 1,200×1,800 mm. Consequently, time for installing the house access floor is shortened and cost can be reduced due to the reduced number of the supports 10.

[0019] Fig. 3 shows a cross-sectional view and a partially exploded plan view of the upper plate 20 according to the preferred embodiment of the present. As shown in Fig. 3, the upper plate 10 includes an upper board 21, a lower board 22, and a reinforcing frame 23 disposed between the upper board 21 and the lower board 22. The reinforcing frame 23 has a quadrangular frame shape corresponding to the rims of the upper board 21 and the lower board 22, and includes at least one reinforcing member, which is disposed in a central axis thereof and secures the high rigidity of the reinforcing frame 23.

[0020] Fig. 4 shows a cross-sectional view and a partially exploded plan view of an upper plate 20 according to another preferred embodiment of the present invention. The upper plate 20 includes an upper board 21, a lower board 22, a reinforcing frame 23, and a core 24 disposed between reinforcing members. The core 24 is made of sound absorbing and insulating material such as glass wool, expandable polystyrene (EPS), or the like, so as to provide the absorb sound and insulation effect.

[0021] The support 10 adopted in the present invention is roughly divided into a head, a height adjusting bolt, and a supporting rubber. More concretely the support 10 includes a plate-shaped head having a nut inserted into a central portion thereof to support the upper plate, a bolt being formed with a slotted recess or cross-shaped recess and associated with the nut so as to adjust the height of the head, and a supporting rubber having a bolt supporting recess for rotatably supporting the bolt formed at the upper portion thereof.

[0022] Preferably, in order to absorb impact transferred to the floor and to reduce vibration transfer, non-elastic rubber is used as the supporting rubber. The shape of the supporting rubber may be selected from among a cylindrical shape advantageous against load, a reverse trapezoidal shape providing stability, and an embossed structure for obtaining

floor impact sound reduction performance.

[0023] An upper plate, having a thickness of 40 mm, and the structure as shown in Fig. 4, is manufactured using particleboard as the upper plate 21 and the lower plate 22, ply wood as the reinforcing member 23, and expanded polystyrene as the core 24, and the deflection of the upper plate is measured. The measured deflections are listed in Table 1. As listed in Table 1, the house access floor according to the preferred embodiment of the present invention is superior to comparative examples 1 and 2 adopting the conventional upper plate, i.e. the deflection of the upper plate according to the preferred embodiment of the present is approximately 4 mm less than the deflections of the comparative examples 1 and 2. The deflection, as shown in Fig. 5, has been measured in such manner that a load of 100 kg is applied to the central portion of an upper surface of the upper plate having a pressing area with a diameter ϕ 80 and scales of a gauge installed below the upper plate are read.

Table 1

Item	Deflection (mm)
Comparative example 1	6.82
Comparative example 2	7.72
Present invention	2.85
Comparative example 1: house access floor system of Japanese Corporation A	
Comparative example 2: house access floor system of Japanese Corporation B	
Present invention: house access floor system adopting high rigidity upper plate according to the preferred embodiment of the present invention	

[0024] Moreover, by employing the high rigidity upper plate 20, the interval between the supports 10 can be widened to 800×1,200 mm, and the floor impact sound can be satisfactorily reduced.

[0025] Fig. 6 and Table 2 show impact sound reducing performance of the upper plate (the preferred embodiment) according to the present invention constructed as described above compared with the conventional house access floor employing the conventional supports and upper plates as shown in Figs. 1a (Comparative example 1) and 1b (Comparative example 2). As shown in Fig. 6 and Table 2, it can be confirmed that the impact sound reduction of the house access floor according to the present invention employing the high rigidity upper plates is 6 dB (A) to 11 dB (A) greater than those of the comparison examples 3 and 4 employing the conventional upper plates. The floor impact reducing performance test has been carried out according to KS F 2810-2, and the result thereof is estimated and compared according to KS F 2863-2. Described in detail, the upper plates are installed in an acoustics laboratory and the floor impact sound is generated by applying a heavy impact source, and then the generated sound is received in a sound receiving room via a microphone so as to be analyzed and estimated.

Table 2

materials	Hz				dB (A)
	63	125	250	500	
Comparative example 3	71.5	73.1	65.8	43.9	56
Comparative example 4	79.6	63.1	58.0	44.9	51
Present invention	70.7	63.2	47.2	38.2	45
Comparative example 3: office access floor system used in Korea (Fig. 1a)					
Comparative example 4: house access floor system used in Japan (Fig. 1b)					
Embodiment: access floor employing the high rigidity upper plates according to the present invention (Fig. 2)					

[0026] As described above, according to the present invention, the light weight of the upper plate can be achieved by employing the high rigidity sandwich upper plate, the interval between the supports wider than that of the conventional access floor system allows rapid installation of the access floor and cost reduction. Moreover, reduction of the floor impact sound is achieved, and the insertion of the sound absorption material and the heat insulation material between the reinforcing members disposed at the upper plate enhances sound absorption and heat insulation.

[0027] Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. An access floor system comprising:

a plurality of supports disposed at regular intervals; and
upper plates placed on the supports, each of the upper plates including an upper board, a lower board, and
a quadrangular reinforcing frame disposed between the upper board and the lower board.

2. The access floor system as set forth in claim 1, wherein the reinforcing frame comprises at least one reinforcing
member, disposed at the central portion thereof, for increasing rigidity.

3. The access floor system as set forth in claim 1, wherein the upper board, the lower board, and the reinforcing
member are made of single or complex material selected from wood, inorganic material, synthetic resin, steel, and
aluminum.

4. The access floor system as set forth in claim 2 or 3, wherein the reinforcing frame further comprises a sound
absorbing material or a heat insulation material inserted between the reinforcing members.

5. The access floor system as set forth in claim 4, wherein the sound absorbing material or the heat insulation material
comprises a synthetic fiber selected from the group of glass wool, rock wool, and polyethylene terephthalate, or
a plastic foam selected from the group of expanded polystyrene, foamed urethane, and foamed polyvinyl chloride
(PVC).

6. The access floor system as set forth in claim 1, wherein the thickness of the upper plates ranges from 20 to 70 mm.

7. The access floor system as set forth in claim 1, wherein the interval between the supports ranges from 600×600
mm to 1,200×1,800 mm.

8. The access floor system as set forth in claim 2 or 3, wherein the reinforcing member comprises multi-ply wood.

Fig. 1a



Fig. 1b



Fig. 2

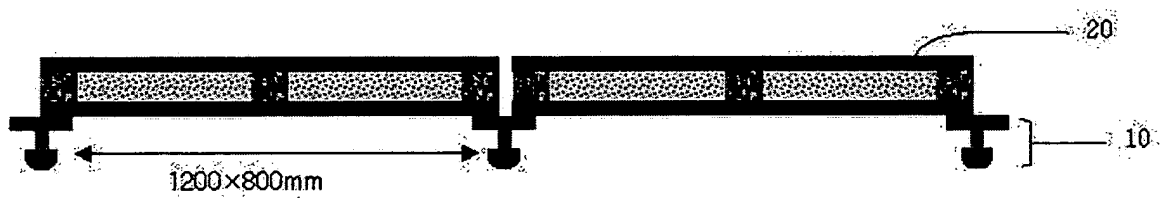


Fig. 3

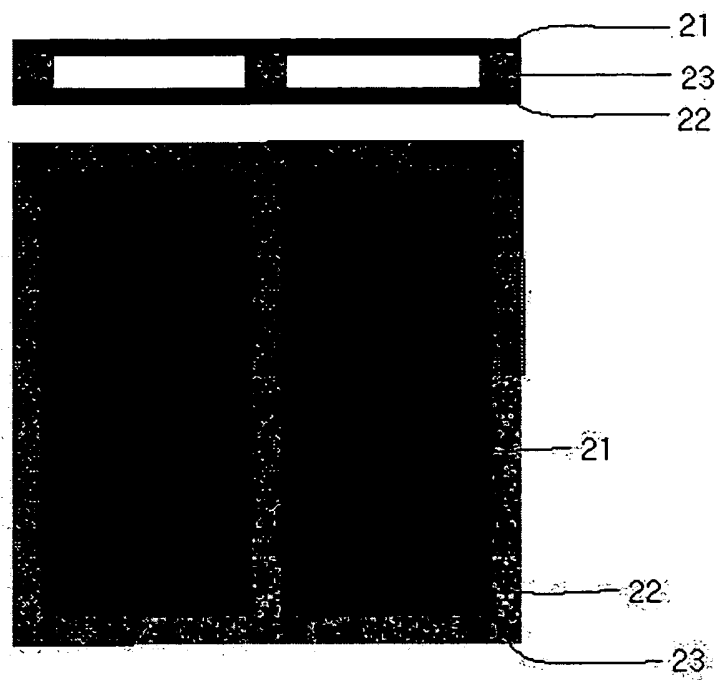


Fig. 4

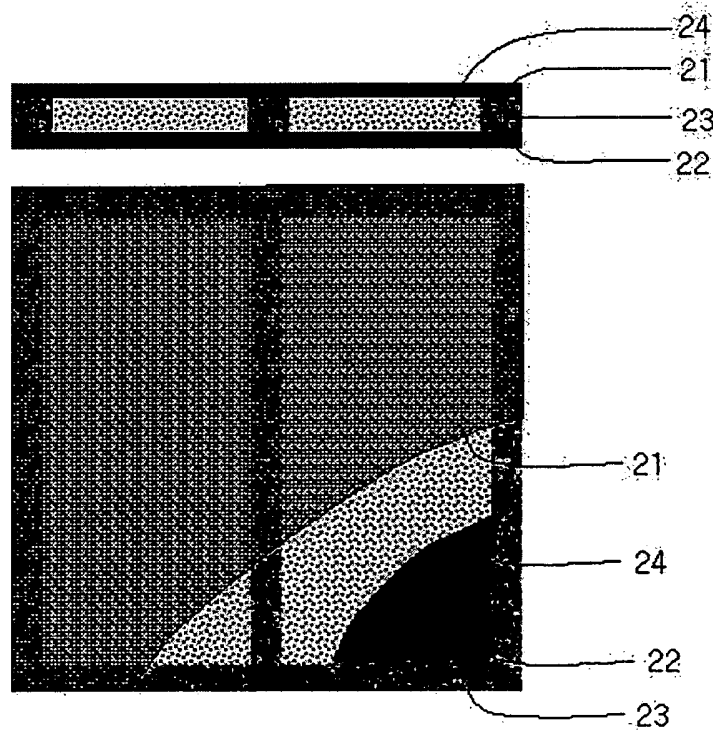


Fig. 5

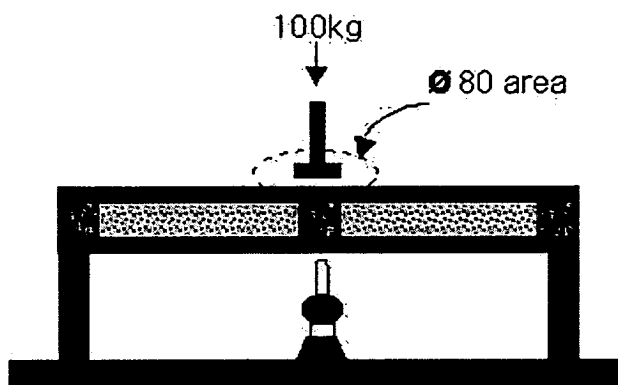


Fig. 6

