

PREFABRICATED ROOM UNIT WITH TERRACE FOR MODULAR INTEGRATED BUILDING

Technical Field

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The present invention relates to a building, in particular to a prefabricated room unit with a terrace for modular integrated building, which can be used in multi-story or high-rise residential or office buildings.

10 Technical Background

Currently, the terrace in a building often adopts an overhanging structure, which is difficult in design and production in a prefabricated manner. In traditional buildings, such projects containing terraces are often completed via cast-in-situ process.

15 However, the construction of the traditional cast-in-situ buildings not only suffers disadvantages such as complicated construction steps, long construction period, intensive labor consumption and hardly controlled quality, but also brings about a large amount of construction rubbish and generates heavy noise and dust pollution, causing great disturbance on daily life of surrounding residents. Moreover, since

20 aluminum templates used in the terrace have to be sealed and are readily deformed after long time of use, the on-site scaffolds should be arranged at more peripheral positions than usual, which not only causes inconvenience for construction, but also generates risks in operation.

25 For this reason, in current buildings, prefabricated beams, semi-prefabricated floor slabs, and even prefabricated units, such as prefabricated balconies, prefabricated bathrooms, prefabricated kitchens or the like, are gradually adopted for speeding up and simplifying the construction procedure. This construction method does reduce part of the on-site construction workload, shorten the construction time

and reduce related labor. However, for buildings containing terraces, it is still necessary to use cast-in-situ concrete structures, or combine adjacent units containing prefabricated terraces with cast-in-situ structures. Therefore, the on-site construction workload is still very large, so that the construction period cannot be further shortened.

5 Moreover, there is a cracking risk when a secondary casting is performed between the prefabricated members and the main body of the building for the purpose of connection. This risk will be deteriorated because the terrace is of an overhanging structure. Furthermore, because the secondary casting is not an in-situ one, the preformed holes of the main body of the building may not be aligned with those of the
10 prefabricated members due to offset.

In some existing modular integrated building units with connecting terraces, the prefabricated terraces are erected on the top of the prefabricated room units. Accordingly, even if the prefabricated room unit and the terrace can be prefabricated
15 into one piece in the factory, the whole height of the thus-formed assembly will be super high in view of the height of prefabricated room unit and that of the rail part of the terrace, which will cause the assembly is too high for transportation. Under such circumstance, the rail part of the terrace cannot be installed in the factory in advance, but only installed after being transported to the construction site. Moreover, the design
20 of the terrace renders that the interior and exterior waterproofing for two vertically adjacent prefabricated room units have to be performed in two individual steps, and the joint areas of said two vertically adjacent prefabricated room units are prone to suffer the problem of water leakage.

25 Summary of the Invention

The technical problem to be solved by the present invention is to provide a prefabricated room unit with a terrace for modular integrated building, whereby the on-site construction workload can be greatly reduced.

According to the technical solution proposed by the present invention, a prefabricated room unit with a terrace for modular integrated building is provided, comprising a prefabricated room body having wall bodies and a top plate. The prefabricated room unit further comprises a terrace connected to the prefabricated room body, and a steel connecting frame. The terrace comprises a terrace bottom plate and terrace bottom beams. The steel connecting frame is buried partially in the prefabricated room body and partially in the terrace to connect the prefabricated room body and the terrace together. The prefabricated room body and the terrace are prefabricated into one piece.

The steel connecting frame comprises two columns, two transverse horizontal rods connecting with said two columns respectively, a longitudinal horizontal rod connecting said two transverse horizontal rods together, and a column-connecting rod connecting to the two columns at their bottoms. Said columns and the column-connecting rod are buried in the wall body where the prefabricated room body meets the terrace, and said transverse horizontal rods and the longitudinal horizontal rod are buried in the terrace bottom beams.

Said columns, said transverse horizontal rods, said longitudinal horizontal rod and said column-connecting rod each are of a square tube structure.

Said transverse horizontal rods and said longitudinal horizontal rod are each provided with rail connectors, which are welded and fixed on top surfaces thereof.

Said rail connector is formed by a square tube with a spacer fixed on a bottom surface thereof.

Said prefabricated room body is provided with a doorway formed in the wall

body connected to the terrace, and said two columns are arranged on left and right sides of said doorway, respectively.

Said columns each have L-shaped connecting ribs that are welded and fixed on
5 an inner side thereof, the L-shaped connecting ribs being buried in the wall body of the prefabricated room body.

Said two transverse horizontal rods each have L-shaped steel angles welded and fixed on the inner sides thereof.

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Said terrace is integrally attached to a bottom of the prefabricated room body.

Said prefabricated room body is provided with a recess at a top of a side thereof connected to the terrace, and with a convex step at a bottom vertically corresponding
15 to the recess, the recess and the convex step of two vertically adjacent prefabricated room bodies being engaged with each other.

Compared with the prior arts, the prefabricated room unit with a terrace for modular integrated building according to the present invention adopts a steel
20 connecting frame to connect the prefabricated room body and the terrace together, which solves the problem that the prefabricated room body and the terrace are difficult to be prefabricated in one piece, thus facilitating the integral prefabrication of both in the factory. In this manner, the above-mentioned disadvantages of connecting the terrace with the prefabricated room unit existing in the prior arts can be
25 completely circumvented, thus further enlarging the scope of prefabrication and achieving a high prefabrication rate. The decorations of the terrace and the prefabricated room unit can be also completed in the factory in advance, and it is unnecessary to seal the aluminum templates at the construction site. Moreover, the prefabricated room unit can be hoisted as normal, with no need for hoisting the terrace

separately. At the same time, the central area and the side area of the building can be constructed in parallel, so that the construction period of a standard level of the building can be shortened from 6 days in the past with partial prefabricated units to 4 days, which means the construction period can be shortened by 33%. In addition, the construction can be performed in a more convenient and fast manner, the on-site construction workload can be greatly reduced, quality can be controlled in a more uniform manner, labor costs can be reduced, and the disturbance of the construction on surrounding residents can be avoided to the maximum extent. Since the terrace is prefabricated at the bottom of the prefabricated room body on the same floor as a whole, installation of the rails and decoration can be completed in the factory, and no over-height problem during transportation will be incurred. Moreover, the interior and exterior waterproofing can be performed in one single step, so that the joint areas of two vertically adjacent prefabricated room units can be prevented from water leakage. Further, the location where the construction is performed is changed from the scaffolds arranged at the periphery of the main body of the building to the floor surface thereof, which greatly reduces the safety risk during construction.

Brief Description of the Drawings

Fig. 1 schematically shows a perspective view of a prefabricated room unit with a terrace for modular integrated building according to the present invention.

Fig. 2 shows a plan view of the prefabricated room unit with a terrace for modular integrated building according to the present invention.

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Fig. 3 is a sectional view along line 1-1 in Fig. 2.

Fig. 4 is a sectional view along line 2-2 in Fig. 2.

Fig. 5 is a sectional view along line 3-3 in Fig. 2, showing the concrete structure.

Fig. 6 schematically shows a perspective view of a steel connecting frame.

5 Fig. 7 shows a vertical section of the steel connecting frame.

Detailed Description of the Invention

In the following, preferred embodiments of the present invention will be further
10 illustrated with reference to the accompany drawings.

As shown in Figs. 1 and 2, a prefabricated room unit with a terrace for modular
integrated building according to the present invention comprises a prefabricated room
body 1, a terrace 2 connected to the prefabricated room body 1, and a steel connecting
15 frame 3. The prefabricated room body 1 comprises wall bodies 11 and a top plate 12,
and may further comprise a bottom plate 13 which is prefabricated into one piece with
the prefabricated room body 1. Of course, the bottom plate 13 can also be a separate
prefabricated plate, which is connected to the prefabricated room body 1 with
cast-in-situ reinforcing concrete at the construction site. The terrace 2 comprises a
20 terrace floor 2, and longitudinal and transverse terrace bottom beams 22. As shown in
Figs. 4 and 5, the steel connecting frame 3 is buried partly in the prefabricated room
body 1 and partly in the terrace 2, thus connecting the prefabricated room body 1 with
the terrace 2. Moreover, the prefabricated room body 1 and the terrace 2 are
prefabricated into one piece in the factory, so that the mold and reinforcing ribs
25 thereof are designed collectively.

As shown in Figs. 6 and 7, said steel connecting frame 3 includes two columns
31, two transverse horizontal rods 32, a longitudinal horizontal rod 33, and a
column-connecting rod 34. Said transverse horizontal rods 32 are connected to the

bottoms of the columns 31 from outside. The ends of the longitudinal horizontal rod 33 are connected to the outer ends of two transverse horizontal rods 32, respectively. Both ends of the column-connecting rod 34 are connected to the bottoms of two columns 31, respectively.

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As shown in Figs. 3 and 4, the columns 31 and the column-connecting rod 34 of the steel connecting frame 3 are buried in the wall body 11 where the prefabricated room body 1 meets the terrace 2, the transverse horizontal rods 32 are buried in the transverse terrace bottom beam 22, while the longitudinal horizontal rod 33 is buried in the longitudinal terrace bottom beam 22. In this manner, the steel connecting frame 3 can be used as a main load-bearing member for the wall body 11 and the terrace 2 of the prefabricated room body 1, so as to firmly connect said two with each other.

In this embodiment, the columns 31, the transverse horizontal rods 32, the longitudinal horizontal rod 33 and the column-connecting rod 34 each can be of a square tube structure, wherein each column 31 is a square tube of 100×100×6.3 mm, the transverse horizontal rods 32 and the longitudinal horizontal rod 33 each are a square tube of 150×100×6.3 mm, and the column-connecting rod 34 is a square tube of 70×70×6 mm. Of course, square tubes of different sizes can be also used based on the size of the terrace and the stress condition.

In addition, a number of rail connectors 4 are welded and fixed on the top surfaces of the transverse horizontal rods 32 and the longitudinal horizontal rod 33, for receiving the rails 8 during decoration. In this embodiment, the rail connectors 4 are each formed as a square tube of 100×100×6.3 mm, with a spacer 5 arranged on the bottom surface thereof.

In this embodiment, as shown in Figs. 1 and 2, the prefabricated room body 1 has a doorway 14 formed in the wall body 11 connected to the terrace 2, for receiving a

terrace door. Said two columns 31 are arranged on the left and right sides of the doorway 14, respectively.

As shown in Fig. 6, each column 31 has a number of pairs of vertically symmetrical L-shaped connecting ribs 6, which are welded and fixed on the inner side of each column 31. The L-shaped connecting ribs 6 are buried in the wall body 11 of the prefabricated room body 1, so as to firmly anchor the columns 31 in the wall body 11, thus preventing the columns 31 from being pulled out of the wall body 11 due to the load of the terrace 2.

As shown in Figs. 3 and 6, the two transverse horizontal rods 32 are each welded and fixed with an L-shaped steel angle 7 on the inner sides thereof, which can strengthen the force-bearing capacity of the transverse horizontal rods 32 in the transverse direction.

As shown in Figs. 1 and 5, the terrace 2 is integrally connected to the bottom of the prefabricated room body 1. In this manner, the decoration of the terrace and the installation of the rails 8 can be completed in the factory, which has no effect on the height of the prefabricated room body 1 and thus will not generate an excessive height unacceptable for transportation. Moreover, the interior and exterior waterproofing operations can be completed in one single step, avoiding the problem of water leakage at the joint areas of two vertically adjacent prefabricated room units.

The prefabricated room body 1 is provided with a recess 15 at the top of a side thereof connected to the terrace 2. In the meantime, the prefabricated room body 1 is further provided with a convex step 16 at the bottom vertically corresponding to the recess 15. In this manner, the recess 15 and the convex step 16 of two vertically adjacent prefabricated room bodies 1 can be engaged with each other, thus further strengthening the leakage-proof performance at the joint areas of two vertically

adjacent prefabricated room units.

The foregoing only describes a preferred embodiment of the present invention, and is not intended to limit the present invention. One skilled in the art can make various changes and modifications on the present invention. Any modifications, equivalent replacements, improvements or the like made within the spirits and principles of the present invention shall fall within the scope of protection of the present invention.

CLAIMS:

1. A prefabricated room unit with a terrace for modular integrated building, comprising a prefabricated room body (1) having wall bodies (11) and a top plate (12),

wherein the prefabricated room unit further comprises a terrace (2) connected to the prefabricated room body (1), and a steel connecting frame (3), the terrace (2) comprising a terrace bottom plate (21) and terrace bottom beams (22), and the steel connecting frame (3) being buried partially in the prefabricated room body (1) and partially in the terrace (2) to connect the prefabricated room body (1) and the terrace (2) together, wherein the prefabricated room body (1) and the terrace (2) are prefabricated into one piece.

2. The prefabricated room unit with a terrace for modular integrated building according to claim 1, wherein the steel connecting frame (3) comprises two columns (31), two transverse horizontal rods (32) connecting with said two columns (31) respectively, a longitudinal horizontal rod (33) connecting said two transverse horizontal rods (32) together, and a column-connecting rod (34) connecting to the two columns (31) at their bottoms, and

wherein said columns (31) and the column-connecting rod (34) are buried in the wall body (11) where the prefabricated room body (1) meets the terrace (2), and said

transverse horizontal rods (32) and the longitudinal horizontal rod (33) are buried in the terrace bottom beams (22).

3. The prefabricated room unit with a terrace for modular integrated building
5 according to claim 2, wherein said columns (31), said transverse horizontal rods (32), said longitudinal horizontal rod (33) and said column-connecting rod (34) each are of a square tube structure.

4. The prefabricated room unit with a terrace for modular integrated building
10 according to claim 2 or 3, wherein said transverse horizontal rods (32) and said longitudinal horizontal rod (33) are each provided with rail connectors (4), which are welded and fixed on top surfaces thereof.

5. The prefabricated room unit with a terrace for modular integrated building
15 according to claim 4, wherein said rail connector (4) is formed by a square tube with a spacer (5) fixed on a bottom surface thereof.

6. The prefabricated room unit with a terrace for modular integrated building
according to claim 2 or 3, wherein said prefabricated room body (1) is provided with a
20 doorway (14) formed in the wall body (11) connected to the terrace (2), and said two columns (31) are arranged on left and right sides of said doorway (14), respectively.

7. The prefabricated room unit with a terrace for modular integrated building
according to claim 2 or 3, wherein said columns (31) each have L-shaped connecting
25 ribs (6) that are welded and fixed on an inner side thereof, the L-shaped connecting ribs (6) being buried in the wall body (11) of the prefabricated room body (1).

8. The prefabricated room unit with a terrace for modular integrated building
according to claim 2 or 3, wherein said two transverse horizontal rods (32) each have

L-shaped steel angles (7) welded and fixed on the inner sides thereof.

9. The prefabricated room unit with a terrace for modular integrated building according to claim 1 or 2 or 3, wherein said terrace (2) is integrally attached to a
5 bottom of the prefabricated room body (1).

10. The prefabricated room unit with a terrace for modular integrated building according to claim 9, wherein said prefabricated room body (1) is provided with a recess (15) at a top of a side thereof connected to the terrace (2), and with a convex
10 step (16) at a bottom vertically corresponding to the recess (15), the recess (15) and the convex step (16) of two vertically adjacent prefabricated room bodies (1) being engaged with each other.