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Study On The Technology of New Structure of Thermal Insulation Prefabricated Panel

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Abstract: In view of the deficiency of current rural housing wallboard and precast sandwich wall panels , In this paper, a new type of structure thermal insulation integrated exterior wall board is designed and optimized. The cement polystyrene particles are used as the basal insulation layer of the prefabricated external wall board, and then pouring the ordinary concrete to form structure thermal insulation integrated wallboard. The base insulation layer is provided with a hole and a steel bar, and the base insulation layer and the ordinary concrete structure layer are combined into a whole. The precast wallboard made of cement polystyrene particles and ordinary concrete is light in weight, which improves the seismic performance of the wallboard. The production process is simple, easy to scale production and easy to popularize.

Introduction

With the rapid development of China's construction industry, The development of prefabricated building at the same time, the demand for building energy efficiency technology is increasing day by day. At present stage, China's assembly building boom, but in rural areas, assembly building promotion is very slow. For the traditional rural construction of residential, construction design generally only consider the residential shelter function, and did not take into account when you have enough comfort, and winter cold summer rural housing, to the winter if there is no heating facilities , The indoor temperature will be lower than the outdoor temperature, usually using coal heating or air conditioning heating. This traditional rural housing has produced a lot of energy consumption, is contrary to the national building energy efficiency policy. Therefore, how to develop the urbanization on the basis of effective building energy-saving technology and low-level assembly of buildings effectively combined to become the focus of today's relevant professional research topics[1][2]. In this paper, combined with the energy saving defects of the external wall of the rural building envelope, this paper puts forward a new type of energy-saving integrated wall panel (hereinafter referred to as the new composite wall panel) which is suitable for the development of rural assembly building. Board design research, production technology and application research[3][4].

The optimization design principle of the new composite wallboard.

There are several principles for designing a new type of composite wallboard:(1) To achieve the goal of achieving structural insulation by ensuring the seismic performance and performance of the new composite wall board; (2) Of the new composite wallboard pillar of ordinary concrete structure layer and the new type of composite wallboard cement polystyrene particles insulation section connection reliable base, makes it a stable overall, stress is clear, structure is reliable; (3) To make sure that the type of plate type of the new type of wall panel is low; (4) New composite wall panels are easy to make and site installation[5].

The design of the new type composite wall panel.

New composite wall board materials and composite form optimization design. Based on the theoretical analysis, the composite wall panel was optimized from the composite form of materials and insulation layer and structure layer, as shown in figure 1. The cement polystyrene granule is chosen as the basement insulation layer of the new composite wall slab. Cement polystyrene particles

are made from polystyrene particles and cement, admixtures according to certain proportion mixing it with lightweight, sound insulation, sound-absorbing, heat insulation and other excellent properties, the fire prevention to B1.

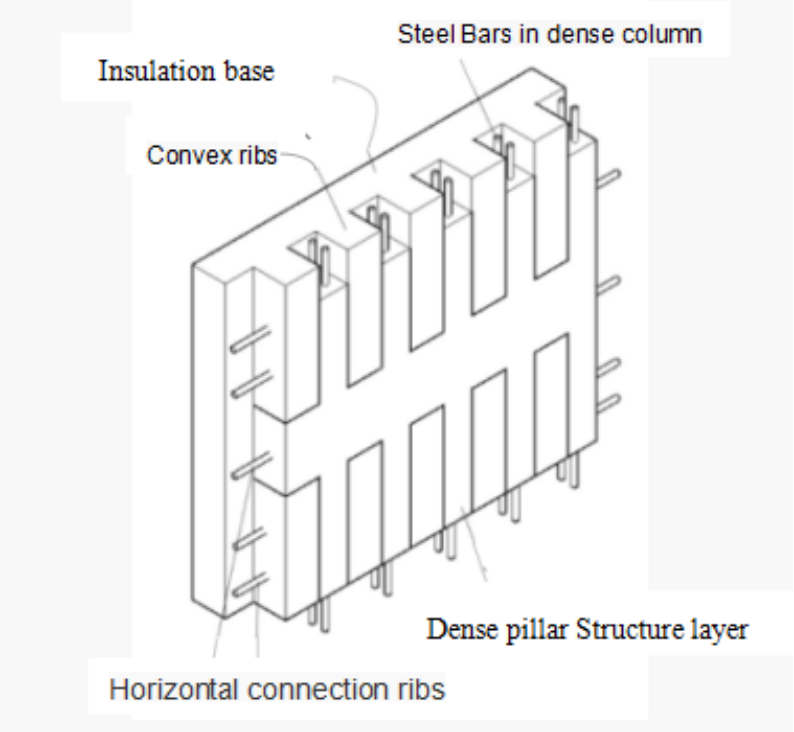

Fig.1. Schematic diagram of a new composite wall structure

In this paper, a new type of composite wallboard insulation base layer including the base of plate shape and protruding convex ribs on one side of the base surface, convex ribs by parallel along the length direction of the base through long and interval of a set of convex rib; Direction of the length of a convex ribs interval set aside with transverse through the unification of the convex ribs level elevation of the connection hole, used to connect a steel bar, with the level of the new type of composite wallboard is greater than the length of the horizontal connection steel plate body width, as shown in figure 2. The height difference between the base portion and the rib portion forms a concave space,dense column structure layer includes pouring in concave space and width corresponding to the width of the concave space within a set of column, the outer side of dense column structure layer, the outer side flush with convex ribs; Located within the concave space coupling bar at the level of all packages within the casting structure in dense column, are embedded in each dense column has a dense column reinforcement, referred to the ends of the dense column reinforced respectively out of column ends, located within the dense column dense column and horizontal bar connection reinforced fixed connection into an organic whole; On the side of the plate body within the department for convex rib, dense column or concave space, to ensure that the side of the plate body of at least one for concave space. The construction method is to facilitate the connection of the left and right wall panels at site construction.

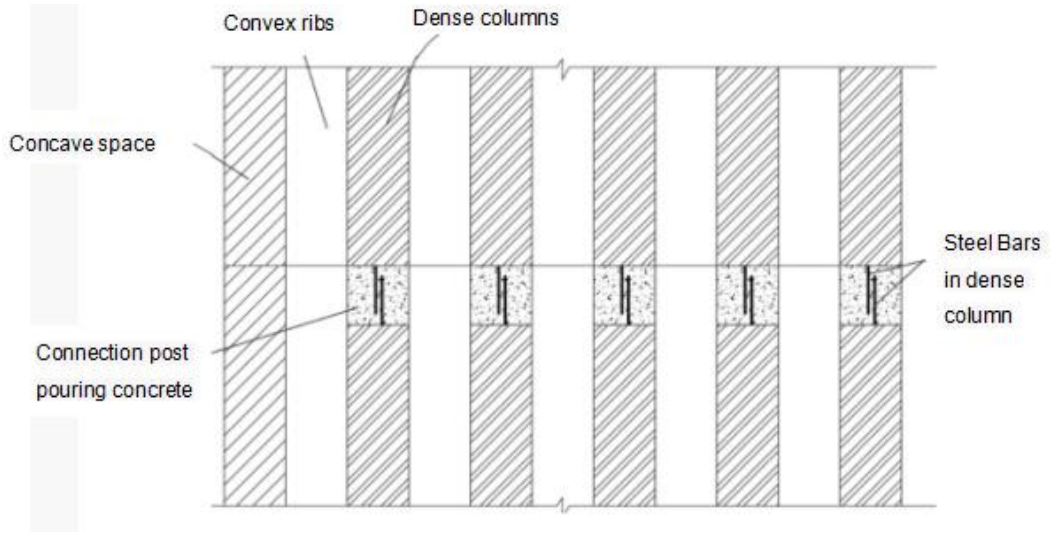

Fig. 2. Connection diagram of upper and lower wallboard

Connection design of new composite wall panel. In this paper, the connection structure of the new composite wallboard, including the left and right stitching of the two pieces of structural insulation of the assembly of the external wall panels, the two side of the plate side of the close fit, one side of the board side of the ribs or One end of the horizontally connecting reinforcing bar extending out of the side portion and extending beyond the width of the adjacent concave space, and the other side edge of the plate body is a concave space, The other end is located in the concave space, the field installation through the concave space horizontal reinforcement of the post-pouring concrete to complete the connection of the left and right wall panels.

The upper and lower connection structures of the new composite wallboard described in this paper include two structural insulation panels with upper and lower stitching, the length of which is smaller than the length of the ribs, one end of which is located in the pillar and The other end of the column bar is also located in the concave space of the column and the rib height, or in the concave space, Vertical reinforcement of the post-pouring pouring concrete to complete the connection of the upper and lower wall panels, see Figure 2.

The mold optimization design of new composite wallboard. As a result of this new composite wall panels using superimposed production methods, first pouring the basement insulation layer of cement polystyrene particles, near the initial pouring after pouring structural layer of ordinary concrete. Because of its structure for the rib-shaped and left with holes inserted through the hole. Therefore, the corresponding mold design must be carried out, the mold material used in the preparation of transparent plastic, the purpose of which can observe whether the cement polystyrene particles vibrating. Plastic mold according to the new composite wall of the substrate insulation layer of the construction measures corresponding to the design, see Figure 3.

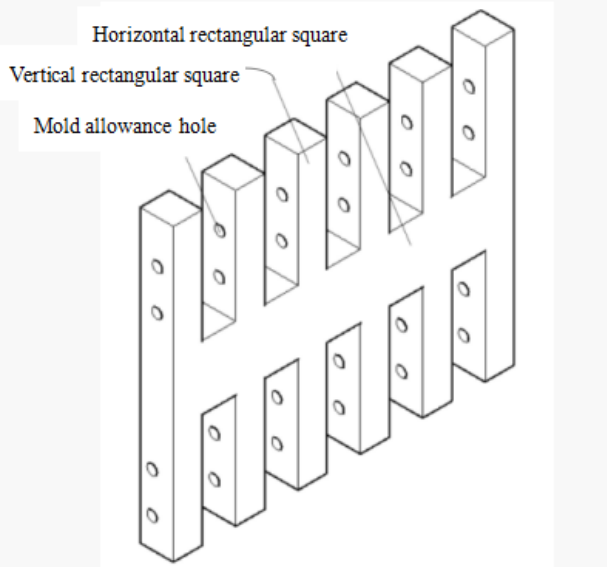

Fig. 3. Schematic diagram of plastic mold

Preparation of new composite wallboard

The new composite wallboard is a prefabricated structure of the assembled building. The production method of the flat mold is used in the prefabricated building factory. The preparation process is as follows:

(1) According to the size of the structural design of the external wall panel, the structure of the structure is the same as that of the structure. The structure of the inner layer of the structure is the same as that of the connecting hole Corresponding die perforation;

(2) The mold table installed, while the mold table to clean up, and in the mold inside the brushing release agent;

(3) In the mold in the first layer of mortar layer, as the board outside the decorative coating layer lining;

(4) The structure of the column within the mold fixed in the mold in the standard height of the pre-designed location to ensure that the thickness of the insulation basement pouring;

(5) Ready with a strength of the tube, and then put the tube into the mold hole, fix both ends of the plastic tube on the die table.

(6)Pouring the cement polystyrene particles into the mold table, vibrating module to make the concrete meet the requirements and form the substrate of the substrate;

(7) To be cemented polystyrene particles to close to the initial coagulation, the removal of the structure of the cavity within the mold cavity to form a concave space, out of the pipe through the formation of connected through holes; according to the structure of the integration of external wall panels board design, And the horizontal connecting steel bar is inserted into the connecting hole, and then the horizontal connecting steel bar and the thick column bar are welded or banded and fixed;

(8) Pouring the concrete into the concave space of the column with the column in step 7, vibrate to achieve the compactness requirement, and form the structural pillar layer;

(9) Curing after 24 hours, and then natural dry;

(10) On the conservation of the board with a mortar layer side of the decorative coating paint to form a decorative layer[6][7].

The characteristics of the new composite wall panel

The new structure of thermal insulation integrated wallboard has the following characteristics:

(1) the new composite wallboard introduced in this paper eliminates the fire hazard of building insulation, and can be applied to the standard of energy saving above 75% and the service life of more than 50 years.

(2) The composite board of the new composite wallboard adopts the insulation layer of the cemented polystyrene granules and the structural layer of the ordinary concrete. The cement polystyrene particles are used as the insulation layer on the side of the board, and the traditional insulation Insulation and sandwich insulation practices, cut off the hot and cold bridge, reducing the loss of energy consumption, cleverly played both the need to heat but also load the problem.

(3) The density of the new composite wallboard relative to the traditional wall panels has been reduced to improve the mechanical performance of the wall panels and improve the shock resistance. At the same time, only two layers of the plate body thickness is smaller than the current shear The thickness of the wall, reducing the weight of the wall, saving materials.

(4) The concrete is connected by placing concrete on the spot, Connection is reliable, the transmission path is clear, with good stability and convenient installation . The new composite wall of the preparation process clever and simple, design a good structure of the pillar layer mold can be completed prefabricated work, easy to promote .

Conclusions

The new structure of thermal insulation prefabricated panel is composed of cement polystyrene particles as a base insulation layer and a compact concrete structure composite, is a set of insulation and structural integration of prefabricated exterior panels. At the same time, the new structure of thermal insulation prefabricated panel is suitable for low-rise residential structure insulation requirements and assembly-style residential. The new structure of thermal insulation prefabricated panels with low cost, easy production, structural insulation integration, no hot and cold bridge, no pull the advantages of the project, making the construction more convenient and easy to promote in rural urban housing.

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