

The Application of Insulation and Decoration Integrated Board in The Construction of High-rise Residential Exterior Walls

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Abstract: Insulation and decoration integrated board is a widely used material in the construction of high-rise residential exterior walls. This material has various advantages, including insulation, waterproofing, fire prevention, environmental protection, and other characteristics, which can improve the overall performance and energy-saving effect of buildings. In addition, the integrated insulation and decoration board has advantages such as easy installation, fast construction speed, and low maintenance costs, which can save construction time and costs. In the construction of high-rise residential exterior walls, the use of insulation and decoration integrated panels can achieve fast, efficient, and safe construction, while ensuring the appearance and decoration effect of the building. Therefore, the application of insulation and decoration integrated panels in the construction of high-rise residential exterior walls has important significance and broad development prospects.

Keywords: Insulation and decoration integrated board, Construction of exterior walls of high-rise residential buildings, Energy saving effect, environment protection.

1. Introduction

With the continuous advancement of urbanization, the construction and renovation of high-rise residential buildings has become an important development trend. However, the external wall insulation and decoration issues of high-rise residential buildings are becoming increasingly prominent. Traditional insulation materials, such as rock wool and glass wool, not only have high construction difficulty and long construction time, but also have poor aesthetic effects after construction and are not environmentally friendly. Therefore, seeking a new type of insulation material is particularly important.

Thermal insulation decorative integrated board is a new type of building material, consisting of two layers of decorative boards, inner and outer, and an insulation material in the middle. It has excellent characteristics such as insulation, waterproofing, fire prevention, and environmental protection, which can effectively improve the insulation effect and overall performance of buildings. At the same time, the construction speed, low construction difficulty, and low maintenance cost of insulation and decoration integrated panels are more suitable for the needs of external wall insulation and decoration in high-rise residential buildings. In recent years, insulation and decoration integrated panels have been widely used in the construction of high-rise residential exterior walls and have become a popular insulation and decoration material.

However, there are currently a wide variety of insulation and decoration integrated panels on the market, with varying quality. Therefore, in the field of exterior wall insulation and decoration in high-rise residential buildings, how to choose suitable insulation and decoration integrated panels, and how to ensure their construction quality and safety are currently urgent issues to be solved. This article aims to study the application of insulation and decoration integrated panels in the construction of high-rise residential exterior walls,

explore their advantages and existing problems, and propose corresponding solutions, providing useful reference for the insulation and decoration work of high-rise residential exterior walls.

2. Traditional Insulation Methods for Exterior Walls of High-rise Residential Buildings

The traditional insulation method for the exterior walls of high-rise residential buildings generally adopts the method of external insulation and internal decoration, which involves adding insulation materials to the surface of the exterior walls and then carrying out indoor decoration. This insulation method has a certain insulation effect, but there are also many drawbacks.

Firstly, the traditional method of external insulation and internal decoration has a long construction cycle and high cost. Due to the need for two constructions, one for insulation construction and the other for interior decoration construction, the construction cycle is long and requires two expenses, which increases the construction cost. In addition, due to the fact that the construction of insulation materials needs to be carried out at high altitudes, the construction process is more dangerous and requires a large amount of manpower and material resources.

Secondly, traditional methods of external insulation and internal decoration have an impact on the load-bearing capacity of buildings. Due to the addition of insulation materials to the exterior wall surface of a building, it can have a certain impact on the load-bearing capacity of the building, especially for some old buildings, which may have some safety hazards.

In addition, traditional external insulation and internal decoration methods also have problems such as easy damage to the insulation layer and flammability, which may lead to safety hazards for buildings.

At the same time, traditional methods of external insulation and internal decoration also have problems such as high construction difficulty, difficulty in ensuring construction quality, and poor durability. For example, during the construction process, the construction of insulation materials is difficult, especially when dealing with building windows, door openings, and other parts, and the construction quality is difficult to guarantee; Moreover, due to the susceptibility of insulation materials to external factors such as climate, their durability is also poor, and they are prone to problems such as aging and cracking.

In summary, traditional methods of external insulation and internal decoration have many drawbacks, mainly including long construction cycles, high costs, high construction difficulty, difficulty in ensuring construction quality, easy damage to the insulation layer, and flammability. These issues not only affect the appearance and decoration effect of buildings, but also affect their safety and service life. Therefore, how to improve construction efficiency, reduce construction costs, ensure construction quality and safety while ensuring insulation effect has become an urgent problem to be solved in the current construction field.

3. Characteristics of Insulation and Decoration Integrated Board

Insulation and decoration integrated board is a type of board composed of rock wool, polystyrene, polyurethane and other materials as the core, and is composed of insulation materials and decorative materials through adhesives. Its characteristics are as follows:

(1) Good insulation performance. The insulation and decoration integrated board adopts high-quality insulation materials, which have excellent insulation performance and can effectively reduce energy consumption.

(2) Convenient and fast construction. The insulation and decoration integrated board adopts on-site prefabrication and factory production methods. During on-site construction, only the board needs to be pasted on the wall, which is fast and effective.

(3) Stable and reliable quality. The insulation and decoration integrated board has undergone factory production, with stable and reliable quality, and excellent waterproof, fireproof, anti-corrosion and other properties.

(4) Beautiful decoration effect is good. The surface of the insulation and decoration integrated board can be selected from various colors, patterns, and materials, which has a good decorative effect and can enhance the aesthetics of the building.

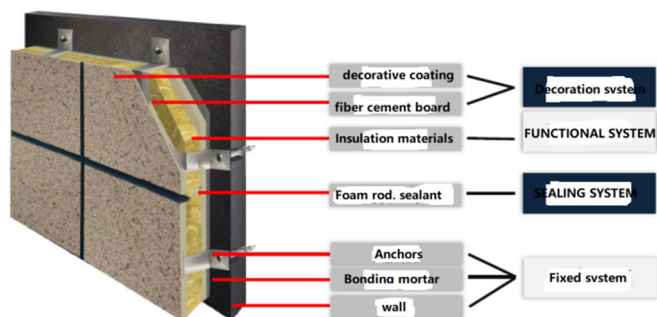


Figure 1. Construction process schematic diagram of insulation and decoration integrated board

4. The Technology of Insulation and Decoration Integrated Board in the Construction of Outer Walls of High rise Residential Buildings

4.1. Wall base treatment

The basic wall surface should be flat, without hollowing or cracking, and the verticality deviation of 2m should not exceed 2mm with a guiding rule. A gap of 40-60mm should be reserved at the connection between the door and window frames and the wall to facilitate the installation of integrated panels. The rainwater pipes on the exterior wall and equipment through the wall pipes should be installed with corresponding embedded parts before the construction of the integrated board. Draw vertical control lines, horizontal control lines, etc. on the wall according to the layout design. Before the construction of the first layer, electric hammers should be used to drill holes in the base wall according to the design or construction setting out position, and the drilling depth and diameter should meet the design requirements.



Figure 2. Installation diagram of wall fixing bracket

4.2. Processing, cutting, insulation and decoration integrated board

According to the drawings and the actual situation on site, use a dedicated cutting machine to process and cut the plates. When cutting, different sizes, insulation layer thicknesses, and colors should be classified and placed, and the stacking of plates should not exceed 1.5m. Set up a fixed clamp installation slot on the side of the on-site processed and cut board panel, and apply sealing agent on the side after the slot is opened. Prepare special bonding mortar according to the proportion specified in the user manual.

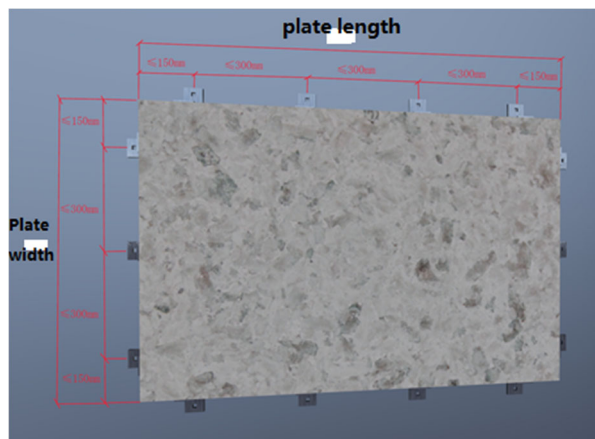


Figure 3. Anchor distribution diagram

4.3. Install insulation and decoration integrated board

The construction of the integrated board should be carried out along the reference line, starting from the horizontal control line position and starting from bottom to top. Lay horizontally according to the predetermined layout position in the horizontal direction; Horizontal construction should follow the principle of starting with external corners and then internal corners, ensuring special structures before large-scale construction.

The construction of the integrated board adopts the dot frame method for pasting, and the board is pushed and pressed to the position on the wall by hand to keep the overall board surface flat and aligned with the grid joints; After pasting, the extruded mortar should be removed in a timely manner; The board seam should be controlled between 6-10mm and the width should be uniform and consistent.

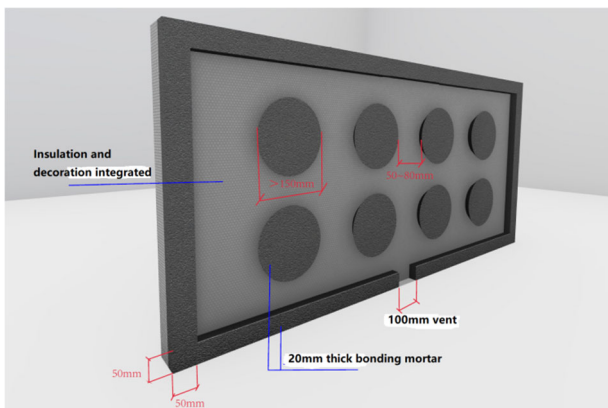


Figure 4. Schematic diagram of point layout of point box method bonding mortar

After pasting the integrated board, install the anchor at the joint of the board. The anchor should be anchored to the panel, and the screws should be screwed in place using special electric tools. If the anchor meets the steel bar, the number of anchor bolts can be increased according to the on-site situation.

72 hours after pasting the integrated board, fill in the foam strip caulking. After caulking, apply silicone weather resistant sealant from top to bottom. The depth of the sealant shall not be less than 5 mm. The overlapping width with the integrated board surface shall not be less than 1 mm. The thickness on the integrated board should be 1~3 mm.

The main function of the drainage pipe is to drain the water between the wall and the integrated insulation and decoration board system. The installation position is at the foot, and the drainage pipe should be set every 5-10m. The breathable parts should be installed at the junction of the board joints before the weather resistant silicone sealant solidifies.

4.4. Finished product acceptance and protection

After completion, check the flatness, verticality, and squareness of the board surface. Those that do not meet the requirements should be replaced in a timely manner, and those that meet the requirements should be protected for finished products.

After all processes are completed, remove the panel

protective film. For locally contaminated areas on the board surface, wipe them clean with a clean towel soaked in water.

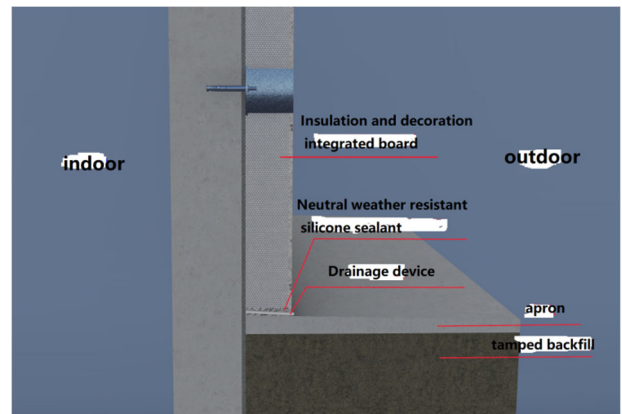


Figure 5. Schematic diagram of system drainage device

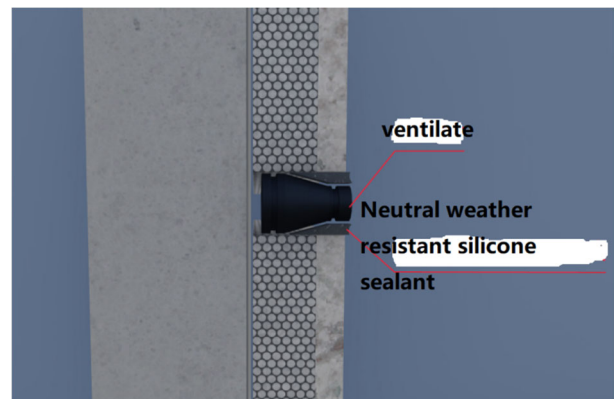


Figure 6. Installation diagram of breathable parts

5. The Application Effect of Insulation and Decoration Integrated Board in The Construction of High-rise Residential Exterior Walls

The application effect of insulation and decoration integrated board in the construction of high-rise residential exterior walls is very significant. Its main advantages are as follows:

(1) Energy conservation and environmental protection. The integrated insulation and decoration board has good insulation performance, which can effectively reduce energy consumption. At the same time, it has good waterproof, fireproof, anti-corrosion and other properties, which can protect walls and extend the service life of buildings.

(2) Convenient and fast construction. The insulation and decoration integrated board adopts a method of on-site prefabrication and factory production, with fast on-site construction speed and good results, which can greatly shorten the construction cycle, reduce construction difficulty, and improve construction efficiency.

(3) Safe and reliable. The integrated insulation and decoration board adopts modern production technology and high-quality materials, which have high safety and reliability, can withstand certain loads and wind pressure, and ensure the structural safety of the building.

(4) The decoration effect is good. The insulation and decoration integrated board can be decorated with various materials, which has good aesthetics and decorative effects

and can meet the needs of different users.

(5) Easy maintenance. The insulation and decoration integrated board has a long service life, simple maintenance, reduced maintenance costs in the later stage, and brought a better user experience.

6. The Problems and Solutions of The Application of Insulation and Decoration Integrated Board in The Construction of High-rise Residential Exterior Walls

6.1. The Problem

There are still some problems in the application of insulation and decoration integrated panels in the construction of high-rise residential exterior walls, mainly manifested in the following aspects:

(1) The construction is difficult. Due to the large height and area of the exterior walls of high-rise residential buildings, the construction difficulty is relatively high, requiring the use of special equipment and tools, as well as possessing certain construction experience and skills.

(2) The bonding layer is not firm. The bonding layer of the insulation and decoration integrated board is the key to ensuring a solid adhesion between the board and the wall. However, due to improper use of the bonding agent or non-standard construction, it may lead to an unstable bonding layer, which affects the effectiveness of the insulation and decoration integrated board.

(3) The decorative layer is uneven. The decorative layer of the insulation and decoration integrated board uses a large number of materials, which is difficult to construct. If construction quality is not paid attention to, it may lead to uneven surface of the decorative layer, affecting the aesthetics and use effect of the building.

6.2. Solution measures

To address the above issues, we can take the following measures:

(1) Strengthen construction management. Provide professional training for construction personnel to improve their construction skills and safety awareness, while strengthening construction site management, standardizing construction processes, and ensuring construction quality.

(2) Choose high-quality materials and adhesives. During the construction process, high-quality insulation and decoration integrated boards, adhesives, and decorative materials should be selected to ensure their reliable quality and meet the usage requirements.

(3) Strengthen construction quality inspection. During the construction process, strengthen the supervision and inspection of construction quality, timely identify and handle problems, and ensure the quality and safety of insulation and decoration integrated panels in the construction of high-rise residential exterior walls.

(4) Use appropriate construction equipment and tools. During the construction process, use appropriate construction equipment and tools, such as hanging baskets, scaffolding, etc., to ensure construction safety and efficiency.

(5) Prepare well before construction. Before construction, conduct sufficient survey and design, develop detailed construction plans and plans, and prepare well for construction to ensure smooth progress.

7. Conclusion

Insulation and decoration integrated board is a new type of building material that has broad application prospects in the construction of high-rise residential exterior walls. It not only plays a role in insulation, insulation, and waterproofing, but also has good decorative effects and maintenance performance. During the construction process, we need to strengthen construction management, select high-quality materials and adhesives, strengthen construction quality inspection, use appropriate construction equipment and tools, and prepare well before construction to ensure the quality and safety of insulation and decoration integrated panels in the construction of high-rise residential exterior walls.

However, there are also some problems and challenges in the construction of insulation and decoration integrated panels. For example, the complex environment at the construction site may affect construction efficiency and quality; Attention should also be paid to the selection and use of adhesives, as excessive or insufficient use can affect the service life and performance of insulation and decoration integrated panels; During the construction process, it is necessary to pay attention to construction safety, especially when working at heights. Therefore, we need to strengthen research and exploration on the construction of insulation and decoration integrated panels, improve construction technology and management level, in order to meet the constantly improving building environmental protection requirements and market demand.

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