International Core Journal of Engineering Volume 9 Issue 10, 2023
ISSN: 2414-1895 DOI: 10.6919/ICJE.202310_9(10).0004

Research on the Technology of Assembly Type External Wall Leakage Prevention Node

Renhong Sun[a], Yiwu Lin[b], Fuxin Hou[c], Zhicheng Bai[d], and Zhiyuan Zhang[e]

China Construction Fourth Engineering Bureau Sixth Construction Co., Ltd 201199, Shanghai, China

[a]1451615739@qq.com, [b]3244266852@qq.com, [c]1697639890@qq.com, [d]463803941@qq.com, [e]2631223247@qq.com

Abstract

External wall leakage is one of the problems faced by many current housing construction projects. The problem of house leakage not only affects the living environment, but also damages the stability of the project and affects the service life of the house. In order to avoid difficulties in effectively solving the problem during the later maintenance of the house, it is necessary to carry out anti leakage construction work on the exterior wall during residential construction, select appropriate anti leakage technology and materials with strong waterproof performance, strengthen construction process control, and ensure the anti leakage effect of the exterior wall. This article mainly analyzes the causes of external wall leakage and proposes key points for anti leakage construction in housing construction projects.

Keywords

External Walls; Anti Leakage; Construction Technique.

1. Introduction

Due to the acceleration of urbanization and limited urban space, the number of high-rise residential buildings has increased, and the relevant construction technology level is also improving. At present, the public's requirements for housing construction projects are also increasing. However, there are some quality issues in current housing projects, such as wall cracks and external wall leakage, which bring adverse experiences to people's lives and also bury safety hazards, greatly affecting the safety of building construction, and even causing huge safety accidents in severe cases. Therefore, it is of great engineering significance to do a good job in the construction of impermeable exterior walls of housing construction projects and ensure construction quality.

2. The Impact of External Wall Leakage on Buildings

There is a leakage problem on the exterior walls of buildings, and outdoor water seeps into the interior. In a relatively warm indoor environment, it can easily lead to problems such as mold, which greatly reduces the comfort of the house. Over time, due to the scalability of different materials, there may also be problems such as bulging, peeling, and cracking of the decoration surface layer, which greatly reduces the comfort of the house and increases the pressure and cost of later maintenance. The application of exterior wall leakage construction technology in housing construction projects is beneficial for residents to create a comfortable living environment.

ISSN: 2414-1895 DOI: 10.6919/ICJE.202310_9(10).0004

3. External Wall Leakage Factors

3.1 Building Materials

The material and quality of building materials have a significant impact on the anti-seepage performance of buildings. In the construction of exterior walls, using hollow bricks with strong insulation properties carries a significant risk of leakage. Materials like hollow bricks have large gaps and absorb moisture from the air. During rainy seasons, rainwater also seeps into the gaps, resulting in leakage; In addition, in the construction of houses, if there are problems with the protection of finished products, this material is prone to cracking due to collision, increasing the probability of external wall leakage. Materials such as autoclaved aerated blocks, when stacked, do not take into account factors such as the site being damp or not covered and being wetted by rainwater, resulting in an increase in material moisture content. A high moisture content can cause uneven shrinkage at the mortar joints, ultimately leading to cracking. In later use, rainwater seeps through the gaps and leaks. Therefore, selecting suitable building materials can achieve twice the result with half the effort in anti permeability.

3.2 Construction Technology

The leakage of external walls is closely related to the construction process of external walls. Due to construction technology reasons, it is usually necessary to set up scaffolding or support, and some process holes are usually left on the exterior wall of the house. These process holes need to be filled in the later stage, and if the cleaning work is not in place, it is easy to cause external wall leakage problems; There are gaps in the connection between the exterior wall and the main structure, and leakage is also prone to occur; Alternatively, the anti leakage construction method may not achieve the expected effect in practical applications and still result in leakage.

3.3 Construction Quality

During the construction process, it is necessary to strictly control the quality of each process and improve the impermeability of the outer wall. If the construction quality is not strictly controlled during on-site construction and the quality points are ignored, it will lead to unqualified exterior wall construction quality and even the overall quality of the entire building.

4. Key Points for Controlling External Wall Leakage Prevention Technology

4.1 Building Materials

(1) Masonry materials such as boards and masonry mortar

The exterior wall needs to purchase building materials that meet the strength grade standards according to the engineering design requirements. Before the external wall panel materials enter the site, the material qualification certificate shall be reviewed, and the batch of materials shall be sampled and tested. Only after passing the inspection can they enter the site for use. When stacking materials, if they come into contact with rainwater, cracking problems may occur. Waterproof measures need to be taken to avoid boards being stacked in damp environments or directly in contact with water, and to strictly control the moisture content of the materials. If the board is soaked in rain, it cannot be used directly. It must be dried and tested for moisture content, and can only be used after reaching the standard. Secondly, the mud content of the construction sand used to fill the gaps should be reasonably controlled, requiring a mud content of less than or equal to 5%. Before cement mixing, the construction sand should be initially screened with a sieve to ensure that the mud content of the sand meets the requirements.

(2) Waterproof material

In the selection of exterior wall waterproofing materials, taking into account local engineering conditions, local climate, and other factors, priority should be given to selecting durable, corrosion-resistant, and stretchable waterproofing materials to avoid cracks or deformation of the exterior wall due to changes in humidity and temperature, as well as long-term use, in order to reduce the risk of

ISSN: 2414-1895 DOI: 10.6919/ICJE.202310_9(10).0004

leakage. When entering the site, waterproof materials also need to be inspected and can only be used after passing the inspection.

4.2 Construction Technology

(1) Construction of exterior wall panels. Before building the exterior wall of a building, it is necessary to clean the surface of the building floor base layer, clean up ash and debris, and avoid the problem of loose connection between cement mortar and the base layer. Finally, after the base layer is inspected and accepted, the exterior wall large plate masonry can be carried out. When using mortar to build exterior walls, it is necessary to sprinkle water in advance to ensure that there is not too much water loss in the mortar after masonry, which may cause loose connections between the exterior wall panels and create gaps. Leakage often occurs at the connection between the exterior wall masonry and the floor slab, and it is usually necessary to insert tie bars into the wall or apply waterproof mortar to the contact surface between the block and the floor slab for compaction treatment. In addition, in the construction of exterior wall masonry, different density masonry materials cannot be mixed, and broken masonry materials cannot be used for masonry.

(2) External wall plastering construction. External wall plastering construction can only be carried out after the acceptance of the main structure is qualified. When filling the gaps between the exterior wall and the concrete floor, beams or columns, 1:3 cement mortar is usually used to fill and compact them in layers, and protective measures are taken for doors, windows, and other parts to avoid collision and leakage of doors and windows. In the construction of external wall plastering, if there is a protruding concrete surface, it needs to be chiseled flat, treated with plain cement mortar, and compacted before construction. For the situation of missing corners in process holes, floor slabs, or exterior wall panels, first clean, fill tightly, or lay neatly, then use 1:3 mortar layer by layer to smooth, and wait for the cement mortar to solidify and cure before proceeding with construction. Before plastering, it is necessary to clean the surface of the wall base layer to ensure that there is no dust, dirt, or oil stains. Two days before plastering, the masonry needs to be watered and wetted. When encountering the bonding area of the external wall masonry constructed with different materials, a 300mm wide steel wire mesh needs to be laid in this area to ensure that the nails are firmly fixed before plastering, in order to reduce the risk of leakage. When starting plastering, first use cement mortar to roughen and increase the adhesion of the wall. After the surface of the masonry solidifies, layer by layer plastering should be carried out with a thickness of 8mm per layer. The layering is mainly to avoid hollowing and cracking caused by material expansion. External wall plastering usually includes three levels: base layer, bottom layer, and surface layer. Quality control needs to be carried out layer by layer, and the proportion of mortar needs to be strictly controlled to ensure the adhesion of mortar. The use of waterproof mortar has a good anti leakage effect. The plastering construction at different levels requires a 24-hour interval, and each layer of plastering should be compacted, filled tightly, and the surface should be basically flat. For external wall plastering, it is necessary to properly handle the window sills and window tops, make a downward slope along the outer edge of the window sills, make a drip line for the eyebrow line on the window, and make drainage holes for the window forms, which can effectively avoid leakage problems in the window parts of the external wall of the house.

(3) Construction of exterior wall waterproof coating. Before the construction of exterior wall waterproof coating, it is necessary to remove dust, soil, and oil stains from the exterior wall surface, and wait for them to dry before the coating can be applied. When there are cracks on the wall, it is necessary to use putty to level it. The putty needs to use waterproof base materials, and priority should be given to selecting putty with good quality produced by regular manufacturers. The thickness of the putty is usually 1mm.

4.3 Finished Products Protection

(1) The plastering construction should be carried out from top to bottom, and corresponding covering measures should be taken to avoid contaminating the finished products of the working section below.

ISSN: 2414-1895 DOI: 10.6919/ICJE.202310_9(10).0004

(2) When maintaining the cement mortar surface, corresponding protective measures should be taken to prevent pollution in the next process.

(3) In order to prevent pollution and chiseling damage to the plastering layer, plastering should be carried out after the installation of water supply and drainage, cables, various pipelines, etc. During construction, relevant protective measures should be taken to protect the installed equipment, pipelines, etc.

(4) Measures should be taken to protect the plaster layer in various climate impacts.

(5) It is necessary to prevent reverse processes and unreasonable rush work from causing damage to the appearance such as chiseling, throwing, and others.

(6) External wall plastering maintenance. The cement used for external wall plastering can only have good strength after sufficient hydration. Usually, the exterior wall surface is watered and maintained 24 hours after plastering. The maintenance work should be carried out at room temperature, requiring watering two or three times, and the maintenance period is generally about two weeks.

5. Conclusion

According to the current situation of housing construction projects, leakage is a very serious problem. If there is external wall leakage in the housing project, it will not only affect the aesthetics of the project, but also affect the stability of the overall structure, laying a huge safety hazard for the project. Therefore, it is necessary to strengthen the anti leakage construction of the exterior wall to ensure its waterproof effect. From the perspective of the main causes of external wall leakage, in order to reduce the probability of external wall leakage, the following points need to be achieved: 1) select suitable waterproof building materials; 2) Conduct on-site acceptance and reasonable stacking of materials; 3) Strengthen construction process quality control; 4) Carry out the construction of waterproof coatings; 5) Protect finished products well. Only from different perspectives can we effectively solve the problem of leakage, provide residents with a more comfortable living environment, and ensure their livable environment and quality of life.

Acknowledgments

Thank you for the project support of CSCEC4B-2023-KTB-18, which is based on the research on the complete construction technology of steel structure prefabricated residential buildings.

References

[1] Aiyong Wang . Discussion on Technical Measures for Leakage Prevention of Building External Walls [J] Technology Perspective, 2022 (26): 3.

[2] Qian Li . Discussion on Key Points of Construction Technology and Site Construction Management in Housing Construction Engineering [J] Building Materials and Decoration, 2019 (26): 152-153.

[3] Hongbing Dai . Research on Key Points of Quality Control in Housing Construction Engineering Construction [J] Technology and Market, 2019, 26 (11): 130-131.

[4] Geng D, Dai N, Guo P, et al. Implicit numerical integration of highly nonlinear plasticity models[J]. Computers and Geotechnics, 2021, 132: 103961.

[5] Zhang D, Cheng Z, Geng D, et al. Experimental and numerical analysis on mesoscale mechanical behavior of coarse aggregates in the asphalt mixture during gyratory compaction[J]. Processes, 2022, 10(1): 47.

[6] Lihua Fan . Application of Exterior Wall Leakage Prevention Construction Technology in Housing Construction Engineering [J]. Juye, 2017 (3): 111-112.

[7] Zhao X, Geng D, Cheng Z, et al. Study on the Performance of Active Embedded Steel Wire Knot Form in Silicone Graphene Composite Thermal Insulation Structure Integrated System[J]. Buildings, 2023, 13(3): 705.

[8] Xianhan Chen . Application of External Wall Leakage Prevention Construction Technology in Housing Construction Engineering [J]. Architecture, Building Materials, Decoration, 2019 (10): 82.

ISSN: 2414-1895 DOI: 10.6919/ICJE.202310_9(10).0004

[9] Jianxu Wang . Application of External Wall Leakage Prevention Construction Technology in Housing Construction Engineering [J]. Decoration and Decoration World, 2019 (17): 288.