

Research on Construction Technology of ALC Wall Panel

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ABSTRACT

This paper introduces the application scope and characteristics of ALC Panel Through an engineering example, it introduces the installation and connection structure of outer wall board and inner wall board in the construction process. This paper introduces the construction process, expounds the control points and quality requirements in the installation process of ALC plate, and puts forward some measures to reduce the loss of plate in construction.

Optimized the construction sequence, reasonably arranged the construction workers, formed flow process, completed the construction task with quality and quantity, shortened the construction period, and achieved the expected results the results can provide reference for similar projects.

Keywords

ALC board, Interior wall panel, Exterior wall panel, Installation method, Technological process, Quality Control.

Introduction

ALC plate is the abbreviation of autoclaved lightweight concrete (autoclaved lightweight concrete) plate, which is made of silica sand and water Mud, lime and other main raw materials, through high temperature, high pressure, steam curing and high performance, multi-purpose porous concrete forming plate, is a kind of performance Superior new building materials ALC plate is the abbreviation of autoclaved lightweight concrete (autoclaved lightweight concrete) plate, which is made of silica sand and water Mud, lime and other main raw materials, through high temperature, high pressure [1], steam curing and high performance, multi-purpose porous concrete forming plate, is a kind of performance Superior new building materials [2].

Application scope and characteristics of ALC Panel**Scope of application**

A LC board is suitable for new, reconstructed or expanded steel structure, reinforced concrete structure, roof panel and non-load

bearing exterior wall of industrial and civil buildings It can also be used as decorative panel or combined with other light insulation materials for external wall insulation [3].

Characteristics

1) ALC board is 1 / 4 of ordinary concrete and 1 / 3 of clay brick in light weight. It has great strength but is lighter than water, so it is known as "high strength" Concrete floating on [4] the water.

2) ALC microstructure is composed of numerous unconnected and uniform micro pores, which makes it have excellent insulation performance Its thermal performance is 10 times that of ordinary concrete, 6 times that of glass and 7 times that of clay brick [5].

3) ALC board is incombustible silicate material with high thermal resistance coefficient, good volume thermal stability, high fire resistance and high thermal stability The fire resistance of the wall panel is 3.23h for the thickness of 100 mm and more than 4H for the thickness of 150 mm; 50mm.

The fire resistance limit of thick plate protection steel beam is more than 3 h, and that of 50 mm thick plate protection steel column is more than 4 h, which all exceed the first class fire resistance standard

4) The microstructure of ALC products is composed of many

uniform and unconnected micro pores, which has the dual characteristics of sound insulation and sound absorption Yes, [6] it can create a high air tightness indoor space and provide a quiet and comfortable living environment

5) The ALC plate has the characteristics of light weight and high strength, and its scientific and reasonable installation node design and installation method make the plate have a certain value [7].

The wall can adapt to large horizontal displacement and angular displacement, so it has superior seismic performance.

6) Construction convenience. Aerated concrete products are accurate in size and light in weight, which can greatly reduce manpower and material input.

High efficiency, can effectively shorten the construction period.

ALC Construction technology of ALC board in a project in Kagmi

Project overview

The project includes three main floors and four local floors of the production plant. The main structure of the plant is steel frame M7.5 cement mortar is used to build the retaining structure below the ground elevation of 1.2m Mu (acre) 15 autoclaved grey brick wall; Autoclaved lightweight aerated concrete is adopted for the exterior wall above 1.2m ground level The fire resistance rating of the project is grade II, the load-bearing structure is steel frame, and the main body is protected 150 mm thick type ALC board is adopted for the wall and internal partition wall. The transverse installation method is adopted for the external wall board, and part of the external wall board is installed Vertical installation; the vertical installation method is adopted for the interior wall panel. Table 1 shows the application of ALC panel in the project.

Table 1: Usage of ALC board in the project M2

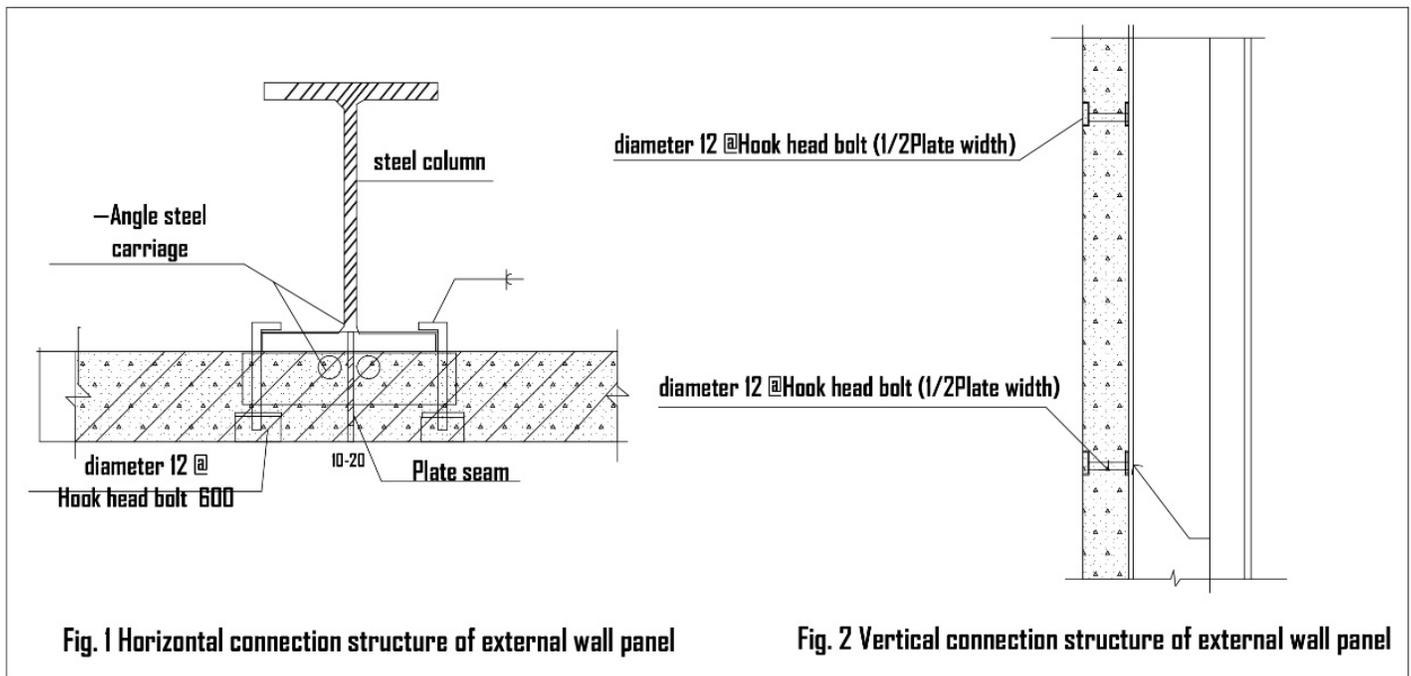
Name	Structural style	Application
Exterior wall panel	steel structure	3030
Partition board	steel structure	1608
Total		4638

Construction of exterior wall panel

The construction of ALC exterior wall panel adopts the "cross wall panel hook bolt fixation method". ①when installing, every 3 panels shall be installed from the ground elevation above 1.2m The load of the plate is transferred to the main structure through the angle steel supporting plate. ② welding the reinforcing angle steel of the door and window openings The ALC plate is fixed on the steel framework and guide angle steel with hook bolts. The connection structure is shown in Figure When the wallboard is installed horizontally, the span of the steel column is large, and the installation from left to right will cause the end part of the wallboard to be suspended and cannot be fixed on the steel column, During the construction, the whole plate shall be fixed between the two steel columns as far as possible. The middle of the two plates is located at the steel column, and the plate with appropriate size shall be cut on site for vertical installation, Two hook bolts are welded on the steel column in advance, which is the so-called "hook bolt fixing method for vertical wall panel". The connection structure is shown in Figure 2.

Construction process: acceptance of main frame structure → setting out and leveling → welding guide full length angle steel and angle steel bracket → installation of door and window reinforcement angle steel

ALC plate drilling, ALC plate placement, installation of hook bolts, correction, welding bolt head bolts, external wall special foam rod, sealant to repair. Repair damaged plate surface → acceptance



Setting of expansion and contraction joints of external wall panels: all vertical joints on the wall surface of horizontal installation panels; [8] One vertical joint shall be set every 20 m for the vertical plate wall with a length greater than 20 m; vertical All the plates are transverse seams; The interval between expansion and contraction joints is 10-20 mm. Treatment method: PE rod is used in the middle and then special sealant is used to seal [9] [3-4].

Construction of inner wall panel

The construction of ALC inner wallboard adopts "bolt fixing method". When the top is installed, expansion bolts should be driven into the concrete beam, and then the through angle should be welded.

After cutting and drilling, the steel ALC Board shall be in place, and the position of the hook bolt shall be corrected before welding[10]. The bottom wedge shall be welded until the cement mortar reaches the specified strength The connection structure is shown in Figure 3 and Figure 4 The construction of ALC inner wallboard adopts [11] "bolt fixing method". When the top is installed, expansion bolts should be driven into the concrete beam, and then the through angle should be welded.

After cutting and drilling, the steel ALC Board shall be in place, and the position of the hook bolt shall be corrected before welding. The bottom wedge shall be welded until the cement mortar reaches the specified strength the connection structure is shown in Figure 3 and Figure 4.

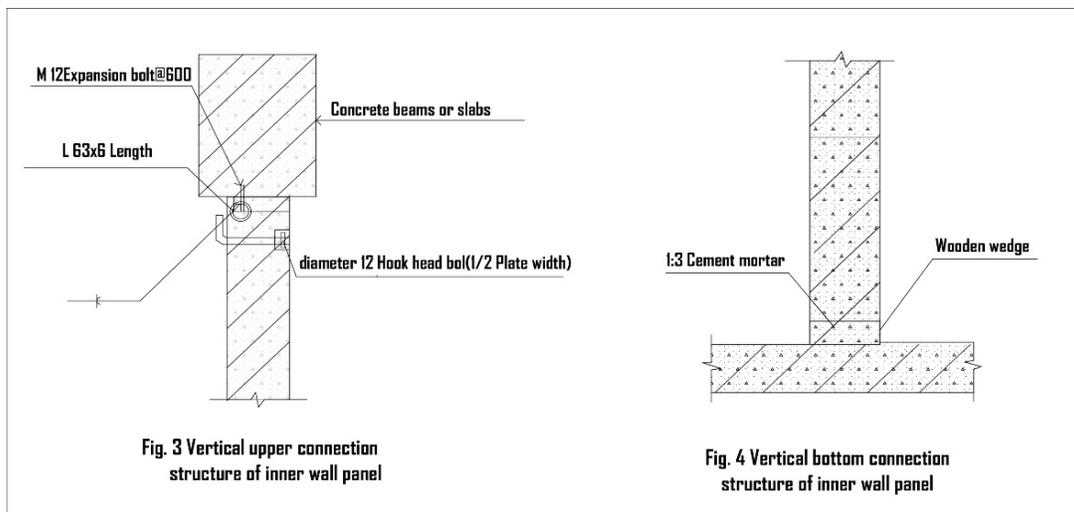
Construction process: setting out and leveling → driving expansion bolt → welding full length angle steel → drilling and positioning of ALC plate → welding and correction of hook bolt.

Insert wood wedge, pour in cement mortar, treat the bottom, clean and accept Setting of expansion and contraction joints of inner wallboard: the interval between expansion and contraction joints of vertical board partition walls is 10-20 mm, Finally, it was pointed with special pointing agent Construction process: setting

out and leveling → driving expansion bolt → welding full length angle steel → drilling and positioning of ALC plate → welding and correction of hook bolt Insert wood wedge, pour in cement mortar, treat the bottom, clean and accept Setting of expansion and contraction joints of inner wallboard: the interval between expansion and contraction joints of vertical board partition walls is 10-20 mm, Finally, it was pointed with special pointing agent [12].

ALC board construction control points

- 1) After entering the site, the type, size, appearance and moisture content of the plates shall be checked and confirmed to ensure that the strips with the same appearance and thickness are selected According to the actual needs, the plates should be cut properly on site. When stacking on site, the site should be flat and the two ends should be set with skids The stack height is less than or equal to 1 m and the stack height is less than or equal to 2 m [13].
- 2) In the process of plate transportation and installation, proper transportation and construction equipment should be used to avoid plate damage.
- 3) The wall panel shall be installed vertically. The wall with door opening shall be installed from the door opening to both ends in turn, and the whole panel shall be used on both sides of the door opening; the interior wall without door opening shall be installed from one end to the other. When the whole plate cannot be used on both sides of the door opening, angle steel shall be used for reinforcement.
- 4) When the ALC plate is slotted, it should be slotted along the longitudinal direction of the plate, and the depth should not be more than 1 / 3 of the plate thickness; When the groove must be cut along the transverse direction of the board, the length of the outer wall board groove is not big 1 / 2 board width, groove depth not more than 20 mm, groove width not more than 30 mm; The depth of the inner wall plate groove is not more than 1 / 3 of the plate thickness [13].
- 5) When ALC board is connected with other walls, beams and columns, 10-20 mm gap must be left at the end, and the gap shall be filled with foaming agent [14].
- 6) The exterior wall joints shall be sealed with special sealant, and the interior wall joints shall be pointed with special pointing agent.



7) After ALC installation, the missing edges and corners should be repaired with special repair powder.

8) All metal fittings for connection shall be derusted, and the galvanized thickness shall be able to adapt to the design service life of the building; whole Section steel for installation shall be fully coated with antirust paint after de-rusting.

9) When ALC board is used as exterior wall board, the connection structure with the main structure should be considered on the basis of ensuring the reliability and safety of joint strength, In order to ensure that the wall can adapt to the main structure of different directions of inter story displacement and meet the requirements of in-plane rotation and ductility The requirement of interlayer deformation of main structure under seismic fortification intensity.

10) When ALC board is used as exterior wall board, the connection structure with the main structure should be considered on the basis of ensuring the reliability and safety of joint strength, in order to ensure that the wall can adapt to the main structure of different directions of inter story displacement and meet the requirements of in-plane rotation and ductility The requirement of interlayer deformation of main structure under seismic fortification intensity.

Quality requirements

1) The installation of ALC board is based on the construction quality standard of building engineering Based on the unified acceptance standard (GB 50300-2001), the, and refer to the technical code for application of autoclaved lightweight aerated concrete slab (db32 / T 184-1998) [5].

2) The installation and connection of the plate shall meet the design requirements and be safe the next process can be carried out only after the installation is inspected and accepted Work.

Table 2: Allowable deviation and inspection method of ALC plate installation.

No.	Project name	Allowable error/ mm	Test method
1	Wall axis position	3	Theodolite, wire and ruler
2	Degree of Vertical wall between floors	3	2m towing board, hanging line
3	Perpendicularity of plate joint	3	2m towing board, hanging line
4	Plate seam level	3	Wire and ruler measurement
5	Seam level	3	2m guiding rule and feeler gauge
6	Seam error	1	Ruler measurement
7	Entrance position	±8	Ruler measurement

3) The repair mortar shall be special mortar. The mortar in the plate joint The Board shall not be subjected to harmful vibration or impact until the filling mortar has hardened

4) The allowable deviation of ALC plate installation shall meet the requirements of Table 2

Conclusion

In this project, steel frame is used as the main structure, and ALC plate is used as the outer enclosure and inner wall plate, which has a good economic benefit The economic and social benefits reflect

the characteristics [15] and advantages of industrial buildings, and conform to the development concept and requirements of green buildings The application of ALC board has a good development prospect. ALC board construction can also effectively shorten the construction period, but it should be strictly controlled in the construction Loss and waste in plate making.

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