Construction Technology of Precast Concrete Wall

Lei Zhang

School of Civil Engineering and Architecture, Southwest Petroleum University, Chengdu, 610500, China

37207893@qq.com

Abstract

Prefabricated assembly technology is a new type of construction production mode,It is an important part of realizing the industrialization of architecture.This paper mainly introduces the construction and application of the assembled concrete wall.And its production, hoisting, installation and other aspects of the construction process and technology are introduced and analyzed, Some suggestions are put forward on the future development of the assembled concrete wall technology.

Keywords

Prefabricated assembly,Construction industrialization,concrete wall,technology.

1. Introduction

The structure of prefabricated assembly wall is a concrete mechanism, which is made of prefabricated or prefabricated wall panels as the main component, which is assembled by the site, and is formed by the partial cast in place[1]. As a new mode of construction production, compared with the traditional cast-in-situ construction, precast concrete structures is to build high quality, production speed, environmental protection, resource conservation, is conducive to the sustainable development of the social advantages.

In recent years, with the promotion of green building and the increase of labor cost, the prefabricated assembly wall structure has been vigorously promoted and used. In view of this, this paper analyzes and discusses the construction technology of precast concrete wall in the construction industry [2].

2. Construction technology of precast concrete wall

2.1 The flow chart of production process

At present, the production technology of precast concrete wall in our country is mainly as follows[2], see Fig. 1.

2.2 production process

After complete the prefabricated concrete external wall mould figure, a file to the mold scheme is designed according to the figure. Concrete prefabricated concrete wallboard molding quality to a large extent influenced by templates, therefore, must according to the precast concrete construction technology characteristics, as well as strictly abide by the concrete component quality standards to design the mould.

In addition, the production process of the production process of the concrete exterior wall member has the following matters needing attention:

In the process of assembly, it is required to pay attention to the bolt of the connection template has been tightened, and there is no omission, to ensure that there is no gap between the template. After the completion of the operation, want to go further, hair clean and rust.

Brushing release agent: the release is best to use oil, waxy release agent, and the need to use the effect of good, quality assurance of products, the release agent brush evenly on the template, and finally with cotton wipe patch, but not guaranteed to light oil.

Aluminum window frames Installation: first do a window frame and the same size as the inner diameter of the bounding box, and the bounding box placed in the inner mold, the final connection bounding box and window frames, to ensure that no detachment. This is embedded install aluminum window frames.

Embedded parts installation: embedded parts must be positioned precisely, there may be deviation within a certain range, a complete embedded parts content is an important indicator of acceptance, in order to ensure that qualified, you'll need to bolt during installation in Building outer locating way, we must first punch holes in the template.

Laying insulation: the use of extruded board insulation material as an important, but need to connect the insulation layer, a protective layer, a layer structure. This requires the use of insulation to the connecting member.

Reinforced structural layer into the mold: the number of reinforced, when the steel cutting and lofting, reference standards are member reinforcement FIG. To ensure that the distance between the steel and steel standard, need to use special plastic spacers, such that the thickness of the protective layer can be effective control.

Structure layer concrete pouring and curing: In order to be able to produce natural hair surface, it is necessary before the first pouring of concrete retarding interface agent applied on steel, applied in accordance with the position of the site to determine the surface-treated hair, after stripping the varnish rinse with water cannons to [3].

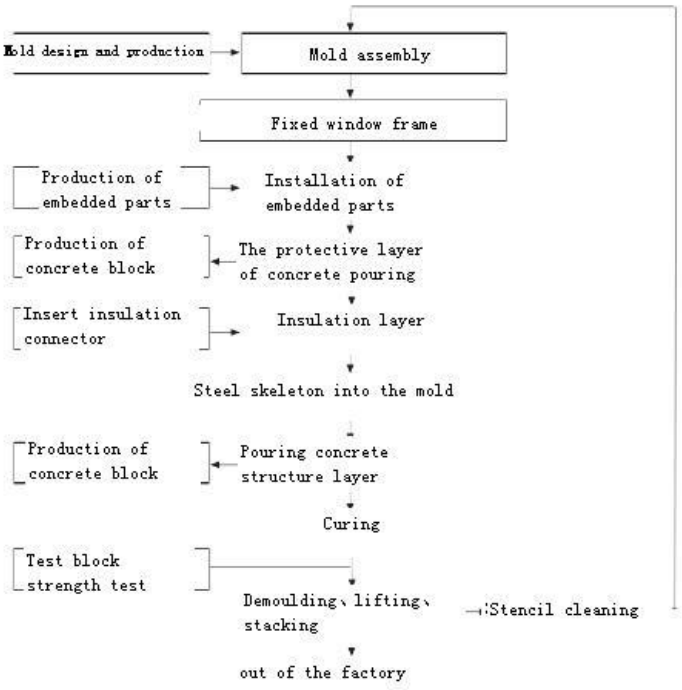

Fig. 1 The flow chart of production process

2.3 prefabricated concrete wall lifting

2.3.1 Lifting and falling

The prefabricated lifting slowly and steadily, prefabricated wall hanging based on the type and size to the specified location, ensure that the installation location is accurate member should fall slowly and smoothly, the bottom edge of the board to be raised from the ground when a pause 50cm, by the operator to position the position of the lower wall embedded steel alignment, vertical wall so slowly decline until 2cm from the embedded steel at the top, hung on both sides of the wall falling alignment control line on the ground, will after the sleeve wall at the bottom of the embedded steel precise alignment, so that a smooth place [4].

2.3.2 installed in place of correction

The prefabricated concrete panels placed in the right position, we will build a vertical wall fixed, this operation need to use the material is adjustable pipe cross support. Wallboard and steel ramp support, in-situ concrete and steel ramp needs to support two fixed with bolts. After these steps are completed, the need for further fine-tuning, that is adjusted in the vertical, horizontal, and out of other aspects of this process need to use two tools, namely the length of the small pipe cross jack and support the aim of the process It is to ensure accurate component position is correct in terms of horizontal, vertical, and so on.

2.3.3 reinforced connections

(1) The connection between the top of the beam and the beam

With line of support will be precast assembly type concrete wall of frame beam and the top are connected and fixed, will be reinforced from the inner side of the upper part has set aside a good U type socket insert and cast-in-place concrete will bar and beam connection. The stirrups to support bridge beam main reinforcement, in accordance with the bottom-up approach over already broke the stirrups. The method can ensure that the results meet the requirements of earthquake resistance, and the operation is convenient and quick, the construction is simple, the lower end is only used to limit the connection, play a fixed connection is the upper end of the anchor.

(2) Connected to the bottom of the beam plate

The connection between the grouting sleeve and the embedded steel bar is the most widely used method for the vertical connection of the wall panels. The sleeve pre buried at the bottom of the upper wall inside, the grouting holes reserved on the bottom and have a certain distance, and the vertical in bars at the top of the lower wall is reserved, in front of the grouting and need to determine the accuracy of the position of wallboards, and secure it. The main reason for this material is that it can connect a variety of precast concrete components, and the integrity of the good, high strength, high mobility, easy to operate, can effectively control the production of cracks.

(3) The connection between the frame column and the frame column

The cast in place has been designed for the precast concrete exterior wall, which is connected with the column and the anchor bar which has already been reserved. Operation, the need to column steel, shear wall first binding, and then lifting the wall plate, and ultimately the anchor bar placed in a precise position on the [5]. Such operation steps can simplify the construction of precast concrete external wall columns, but also can improve work efficiency, make full use of the various components, and ultimately ensure the penetration resistance of the joints[6].

2.3.4 grouting

Filling and connecting precast facades sleeve wall sit under the plasma are used CG-MJM-VI type high-strength non-shrink grout, strength class C85, having no shrinkage (even micro-expansion), aggregate size is small, fast hard , high strength, high flow characteristics, to meet the requirements of grout joints with mortar. 1 d compressive strength can reach more than 45 MPa [7].

3. assembly technology construction heavy and difficult

3.1 key points and measures of construction

In the production process of the prefabricated plate, the number and position of the steel bars connected with each side of the cutting edge must be the same. Take measures to complete precast floor left stubble connecting reinforcement design and construction units detailed disclosure by in mold around the bomb line determine left stubble reinforced the position and number of connections.

The position of the fixed parts and the direction of the mechanical and electrical lines should be closely matched to avoid the damage of the mechanical and electrical pipeline during installation of the fixed parts. The measures taken in advance to design fixed parts and electromechanical pipeline, to the workers. After the on-site monitoring foreman.

The construction precision, the component size requirement is high, the fixed part connection request is reliable. The measures adopted are in strict accordance with the drawings, deepening the design,

construction specifications, operating standards and other components of the completion of the production, on-site lifting.

3.2 construction difficulties and measures

Lifting operations to ensure the safety factor limb security in place, reliable, hoisting operator should not be close to the front, according to operational requirements, to the wall near the ceiling in place at the point of 20 to 30mm, then the operator will help board bit.

Tight fit between the driver and the signal tower crane lifting workers accurately place the key lies in the command signal workers, the stringent requirements of the signal workers certificates, field tests, after the operation.

Members and a wide variety of mostly similar, likely to cause confusion and reasonable arrangements for the installation location prefabricated materials storage areas, laying classification, label the required critical information on the location, date of admission, date of installation clear installation [7].

4. Status and Development of prefabricated technology

The construction of assembly type structure can effectively reduce the amount of work in the construction site, reduce the labor cost, can to some extent reduce material waste and reduce construction noise, dust pollution, construction waste and sewage discharge, there is conducive to energy conservation and environmental protection. In view of the current situation that the labor force is decreasing and the labor price is increasing, the assembly structure is bound to be the development direction of the construction industry in the future.

References

[1] X.Z.Zhang,Y.L.Li and H.Y.An: Research and Prospect of prefabricated concrete shear wall structure, Building Science, Vol. 1 (2014), p.49-52.

[2] M.H.Lin: Prefabricated Concrete Construction Technology Exterior Wall [J]. Sichuan Building Science, Vol. 5 (2014), p.330.

[3] Q.B.Cui: Prefabricated concrete structure and construction considerations [J]. Science and Technology Information, Vol. 6 (2013), p.427-428.

[4] H.W.Yang,L.J.Wang and H.Hui: Fabricated structure installation and construction technology. Architecture Technology,Vol. 1(2013), p. 28-29.

[5] X.M.Li,R.D.Gao and Q.F.Xu: Prefabricated concrete frame ductility node efficient Experimental Study. Central South University (Natural Science),Vol. 8(2013), p. 123-127.

[6] J.W.Chen,Y.P.Su: Prefabricated shear wall structure and connection technology. World Earthquake Engineering,Vol. 8 (2013), p. 45-51.

[7] S.Shi,H.T.Wang and X.Q.Wang: Prefabricated structures in the construction field application. Construction Technology,Vol. 8 (2014), p.16-17.