

Research on the engineering application of the wall energy saving technology of the green building based on the sustainable development

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Abstract: This paper mainly studies on the engineering application of the wall energy saving technology of high-rise building. It is from the wall body engineering construction preparation, wall masonry, quality control, finished product protection, security technology, energy saving project acceptance, etc., explore the special construction scheme of wall energy-saving projects, ensure the quality of the wall body energy saving project, achieve good effect of building energy conservation.

Keywords: The sustainable development, The Green Building, Wall energy saving, quality control, Energy saving project acceptance

1 Introduction

5 # high-rise residential buildings of a residential district, 30 second floor on the ground, there is only one floor underground, A: the gross area is approximately 38536.66 m². The wall USES the shear wall structure, wall energy-saving design description: Styrene gathering originative design is 30 mm thick steel wire wall thermal insulation board, interior wall thickness of 20 mm of vitrified beads insulation is adopted for the design, floors, energy-saving insulation installation of floor heating radiator with the payment. Roof design adopts flat roof, In addition to the staircase, hallway without heating requirements, all the other rooms are asked to consider the winter heating, heating of the heat source adopt the mode of interior wall hanging furnace, floor heating design adopt the mode of thermal radiation. Adopt single box double glass Windows design model steel window, require air tightness must be more than 4 level, the window glass with hollow glass.

2 Text

In order to ensure the construction energy conservation and meet the design requirements, this project must be in strict accordance with the building energy conservation engineering construction quality acceptance specification, to ensure that the wall body energy saving project quality, to achieve good effect of building energy conservation, according to the engineering design requirement and actual situation, prepare the wall energy-saving special engineering construction plan.

2.1 Construction preparation

2.1.1 Material preparation

Exterior wall materials with 200 mm thick of aerated concrete block, the main specifications of block length is 600 mm, block width should be the same as the wall thickness, block density must be up to 700 kg/m³, not less than MU5.0 strength grade.

The appearance of the aerated concrete block quality should comply with the rules, the size of the block specifications and uniformity, must have a production certificate and quality inspection certificate. This project adopts the silicon cement or mineral silicon cement 42.5. Sand should be in size medium sand within 5 mm. For mortar strength grade under the M5, sand silt content requirements of no more than 10%. For mortar strength grade above the M5, sand silt content requirements of no more than 5%, must not be found in the sand and lime, clod and grassroots sundry.

All kinds of raw materials should be determined by the site quality member arena for raw material acceptance according to the material approach acceptance criteria, fill in the material approach acceptance record at the same time. Technical characteristics of the raw materials, the apparent density, coefficient of thermal conductivity, compressive strength, dimensional changes, bibulous rate, etc., should comply with the design requirements.

2.1.2 Construction conditions of preparation

According to the engineering design drawings, first measure, positioning, pay-off, pop-up wall axis, wall side line, windows and doors hole position line, etc., measure and check test. Mortar shall be conducted by the laboratory test with in advance, guarantee bond strength, the best dry-mixed mortar mixture ratio. The day before the wall masonry, should be the building site clean up old masonry, then water wet, can good bonding between the old and new masonry.

2.2 Wall masonry construction

The project block masonry appropriate USES transit type set of build by laying bricks or stones method, leather block break up and down, the requirement is not less than one-third of the block length. If the upper and lower skin brick

staggered joints length is insufficient, should be in the horizontal mortar joint, configuration 2 pieces of rachel Φ 6 mm steel or Φ the strengthening of 4 mm steel fabric, require reinforcement length not less than 700 mm.

Wall masonry construction process, the first is on the wall of sight pay-off, Wall axis in laying position, inside and outside the line. According to the floor height again and block every skin height, mortar joint thickness etc. make skin stem, and erect in the vertical and horizontal wall junction, between the wall corner, pull the control line, make wall transverse flat vertical, then at the bottom wall, cast first 150 mm candy machine, or sintered common brick masonry 200 mm high. Pay attention to, in other parts of the except at the bottom of the block wall, can't put the dry density and the strength grade of different block mix build by laying bricks or stones together, also cannot block or brick build by laying bricks or stones and other materials. If the block filler wall height more than 4 m, appropriate place in half way up the brick wall, or Windows and doors hole at the top of the place, adding tong long level of reinforced concrete beam, and at the ends of the column or concrete wall joint together, pull beam main reinforcement configuration USES 4 ϕ 12, stirrup can use ϕ 6 @ 150, beam width should be the same as the wall thickness, pull beam height is 180 mm.

Each building block filler wall, shall be on the corner of wall, wall junction, the side wall the window etc., set up the constructional column. If the wall Windows and doors hole or equipment hole at the top, there is no design of beam, shall be added a precast reinforced concrete columns, when lintel at both ends and concrete column or wall distance is close, the prefabricated lintel should be changed into cast-in-situ concrete beam, connected directly with the column. When the block is building to the bottom of the beam, plate, should rest for a period of time, on top of the wall again, with sintered common brick syrurcrowede inclined build by laying bricks or stones, the inclination of the brick can't less than 60° .

Structure size and location of the aerated concrete block masonry allowable deviation should comply with the provisions of the table 1.

Table 1 Structure Size and Location of the Aerated Concrete Block Masonry Allowable Deviation

items are	project	allowable deviation (mm)	inspection methods
1	the thickness of the masonry	± 4	amount with your ruler
2	top surface and floor, the ground elevation	± 15	use level, the theodolite review or check construction record
3	axis displacement	5	
4	the perpendicularity of the wall (1) on each floor (2) all high	5 10	(1) check by the messenger wire method (2) using theodolite or messenger wire feet quantity check
5	surface is flat and level	6	in 2 m long ruler and feeler check
6	straight horizontal mortar joint	7	grey sew mouth with 10 m long straight and feet to check

2.3 Project quality control

Engineering of aerated concrete block must comply with the design requirements, after the block comes into play, must be immediately field sampling, and sampling inspection. Mainly includes the detection index bulk density, compressive strength, coefficient of thermal conductivity, combustion performance, etc., after passing test can be used in engineering. Before the wall energy conservation engineering construction, should be handled at the base, and the quality of grassroots acceptance, in order to meet the following key process, thermal insulation layer construction requirements.

Also should be reasonable arrangement of masonry engineering and installation coordination, general should be construction installation is complete door window frame on the wall, embedded hydropower pipeline, equipment fittings etc. after partial project, only for the wall surface of the construction. The wall energy-saving projects all kinds of construction project construction practice should be in line with the requirements of design standards and specifications. Thermal insulation block masonry walls, should be used with functions of thermal insulation mortar masonry. Masonry mortar strength grade should meet the design requirements. The wall meet plumpness levels of gray should not be less than 90%, vertical gray meet should not be less than 80%. Inspection method is to control design verification construction schemes and thermal insulation mortar strength test report. With the grid check ash on the mortar plumpness.

To prevent the wall surface cracks, must be in the corners of doors and Windows and other stress concentration area, nail a wire mesh enhanced processing. Wire mesh of the shop is stuck, take accord with the requirement of design and construction technical specification, rachel nets shall not be bent, wrinkles, loose, the leakage. To install air-conditioning system's room, the hall, in the outer wall heat bridge area, should take the thermal bridge partition processing according to the design requirements. For key parts of the wall construction, such as wear casing wall around, such as holes, the same thermal bridge partition measures should be taken.

For a component such as wall, column, beam on the leakage of Yang Angle protruding points, and the place such as doors and windows around the mouth of the cave, the thermal insulation layer also strengthen measures should be taken, to have the effect of preventing cracking and breakage.

2.4 The finished product protection

Block in loading and unloading, transportation, lifting and installation, to put light with light, according to block the dosage of the floor, each unit, each room, according to the varieties, specification, grade, using different parts, stacking neatly respectively. In the construction installation, note shall not be arbitrarily collision or mobile embedded pipe fittings, so as not to cause damage or displacement. If due to the need of construction must move the line, Installation personnel's prior consent shall be obtained, and coordinates with the installation personnel processing, so as not to affect the subsequent installation project. In the process of construction, want to fall to the ground paste, sundry etc. To clean up, avoid pulp and floors, bonding, subsequent processing difficulties. If you need equipment reserved holes on the wall, should leave ahead of schedule when the wall masonry, after the completion of the notice shall not be in the wall masonry, then cut open hole wall, affecting wall integrity.

2.5 Security technology

In the construction must strictly abide by rules of safe operation seriously, establish safety responsibility system, to develop safe and reliable technical measures. Before entering the construction site, must be safety technical disclosure and safety training for workers. Operating personnel training appraisal for construction machinery, safety personnel should make safety inspection work.

The vertical lifting block focus on lifting cage or block should be adopted. Attention should be paid to control blocks stacked on the floor not too concentrated, number can't pile up too much. Shall ensure that the total weight of accumulation of block shall not exceed the design allows carrying value of the floor. Building safety net should be the second layer along the scaffolding began. In the process of the wall masonry, the cantilever component of partial stability is poorer, independent column, the wall between Windows etc. All should provide temporary support, to prevent capsizing. Block of building height every day appropriate control in step 1.8m or scaffold height. The balcony surrounding, unprotected roof surrounding to set the two protective railings of 1.2 m high, and set the fixed height not less than 18 cm foot.

2.6 Wall energy saving project acceptance

2.6.1 General provisions

Should be in the main structure and the basic equal parts upon the acceptance of project quality, the wall can be energy conservation engineering construction. And the main structure construction of the wall energy-saving projects at the same time, should be acceptance together with the main structure. With the main materials for the project, such as thermal insulation board, thermal insulation paste, bonding material, etc., when in sampling inspection. Test indicators include: (1) the coefficient of thermal conductivity of insulation board, the density of material, the compression strength, flame retardant; (2) the coefficient of thermal conductivity of insulation paste, the compression strength, softening coefficient and setting time; (3) bonding material and the plaster mortar bond strength; (4) strengthen net mechanical properties, corrosion resistance; (5) other thermal properties of thermal insulation material. for hidden in wall body energy saving engineering project, should have detailed written records and images, and approved by supervision engineer acceptance in time.

Wall energy saving project main material of the reinspection are shown in table 2.

Table 2 Wall Energy Saving Project Main Material of the Reinspection

the serial number	the name of the material	the reinspection project
1	insulation board	coefficient of thermal conductivity, material density, compression strength, flame retardancy
2	insulation paste	coefficient of thermal conductivity, compression strength and softening coefficient and the setting time
3	bonding material and the mortar	bond strength
4	Strengthen the network	mechanical properties, corrosion resistance
5	other heat preservation material	the thermal performance
6	other the reinspection project	when necessary, can increase the other items in the reinspection or project in the contract the reinspection

2.6.2 It mainly controls the project

All kinds of wall energy-saving materials, components etc., shall comply with the design requirements and the provisions of the relevant standards, the main inspection items including quality certificate, the performance test report or type test reports, check the number for each batch of not less than one.

All kinds of insulation board, bonding material, rachel nets etc. , the reinspection should comply with the provisions of the relevant specification, content is mainly to check the reinspection report, the same manufacturer to produce the same kind of products check number of not less than a set of sample group. At the grass-roots level shall be disposed of in accordance with the requirements of the design and construction scheme In front of the wall body energy saving construction. And is in line with the subsequent construction process quality requirements, basic requirements for all observations to check Design drawings and construction scheme. The wall of each structural layer construction practice should comply with the design requirements and related standards, norms, and according to the examination and approval of construction organization design unit engineering or special construction scheme for the construction, inspection method is to check each structural layer of concealed engineering acceptance records.

3 Conclusion

As a result, building energy efficiency is of major issues to china's economic and social sustainable development. Right on the basis of the theory of sustainable development to guide the implementation of building energy efficiency, is the fundamental guarantee of building energy efficiency as to meet the requirements of sustainable development. Building energy efficiency in China in the leap-forward development of turnings, in the face of resource depletion, environmental degradation, ecological destruction, a series of serious problems such as climate warming, building energy conservation must walk the path of sustainable development measures, attaches great importance to energy saving buildings, the green building, ecological construction etc. development and application. We want to set up the concept of the comprehensive, coordination, the sustainable development, ensure the realization of our country energy sustainable development goals.

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