Analysis on Key Points of Quality Control of Waterproof Engineering in Residential Buildings

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Abstract. Building waterproofing engineering mainly aims at roof waterproofing, basement waterproofing and floor waterproofing (toilet bathroom, kitchen) waterproofing, which is an important part of building waterproofing engineering. Therefore, on the basis of briefly expounding the importance of roof waterproofing, basement waterproofing and floor waterproofing (toilet bathroom, kitchen), this paper analyzes the main points of quality control of different waterproofing projects, and the methods and measures to solve these problems are discussed. It is expected that through the analysis and research of this paper, it can provide reference and reference for the effective control of the quality of building waterproofing engineering.

1. Introduction

Building waterproofing engineering is the main component of building products, and is one of the basic functions of building products. The quality of its engineering not only affects the quality of people's lives but also determines the normal production.

Since the beginning of the 21st century, the level of waterproof engineering in our country has developed by leaps and bounds, which is manifested by the rapid development of waterproof material industry, the vigorous research and development of new products, and the introduction and use for reference of advanced technology and equipment from developed countries, the variety of waterproof materials is constantly increasing, the level of production technology has been greatly improved, and some products have approached or reached the standards and levels of similar products in developed countries; the China Building Waterproofing Association has been established to promote the development and exchange of waterproofing engineering technology at a higher level; relevant departments increase the management of qualification grades for waterproofing construction enterprises to improve the professional requirements of constructors and formulate special waterproofing norms, so as to put forward more specific requirements for the design, construction, and materials of waterproofing projects. In spite of this, the building leakage has been the most prominent building quality problems, so the quality of building waterproofing project is still worth studying.

2. Overview of building waterproofing project

Building waterproofing is a divisional engineering, its function is to make the building or structure in the design durability, prevent rain water and production, living water leakage and groundwater erosion, to ensure that the building structure, internal space is not polluted and to provide people with
a comfortable and safe living space environment, so it occupies an important position in the whole construction project.

According to the different construction position, the waterproofing works mainly include: (1) roof waterproofing; (2) underground waterproofing; (3) ground waterproofing (toilet, bathroom, kitchen), and so on. Roof waterproofing project is an important project of housing construction [1], mainly to prevent rain water, snow and other natural phenomena of water. According to the different roof waterproof materials are divided into roll waterproof layer roof (flexible waterproof layer roof), coated waterproof roof, rigid waterproof roof. It can be divided into slope roof waterproofing flat roof waterproofing planting roof waterproofing and so on. Underground waterproofing is a complex and extremely important system engineering because its roof elevation is below the outdoor floor. The periphery of basement is in the range of groundwater all the year round, which is greatly influenced by groundwater, and the construction quality of basement waterproofing project is slightly defective, so the groundwater will invade the basement, and the construction of basement is usually connected with the main part of ground. Therefore, in addition to the waterproof function of underground waterproofing works, the construction of underground waterproofing works also has a direct impact on the safety and service life of buildings. At present, the underground waterproofing works of buildings mainly have the following three types: (1) structural self-waterproofing. Through waterproof concrete to achieve waterproof function, is the structure of the building and the combination of waterproofing; (2) waterproof surface waterproof layer. The external surface of the structure is provided with a waterproof layer, usually a waterproof layer of cement mortar, a waterproof layer of rolled materials, a waterproof layer of coating, etc.; (3) the third way is the combination of prevention and discharge. Waterproofing plus drainage measures are used to achieve the waterproofing effect of buildings, usually including internal drainage, seeping drainage, blind ditch drainage, etc. Ground waterproofing works mainly for residential toilet bathroom and kitchen floor waterproofing. Water pipes, heating pipes, natural gas pipelines and so on are concentrated in these parts, which are easy to leak. Therefore, the treatment of these parts in the building waterproofing works is also very important.

3. Key points for quality control of waterproofing works

3.1 Roof waterproofing

In the construction of roof waterproofing engineering, waterproof engineering design, selection of waterproof materials, roof structure, roof details and other factors will directly or indirectly lead to roof leakage. From the point of view of waterproofing design engineering, the design of waterproofing engineering is the premise or foundation to ensure the effectiveness of waterproofing construction. However, the main problems of roof waterproofing design are that the design of drainage system is unreasonable and the position of drainage outlet is not correct. The slope of the drainage can’t meet the use of needs, which makes every rainy season, the drainage system can’t be timely and effective discharge of rain water, leading to housing by rain water erosion, and then affect the quality of housing, endangering life safety. Therefore, the designers should inspect the slope and surface smoothness of the leveling layer by surveying the construction scope and environment on the spot, combining with the local climatic conditions, rain water strength and the seepage effect of the melting snow on the house, and so on. To ensure that the slope of the leveling layer can drain smoothly so as to work out a scientific and reasonable design scheme for roof waterproofing; from the perspective of the roofing waterproof layer materials used in the roof waterproofing works, it can be divided into roll waterproof layer roof (flexible waterproof layer roof) coated waterproof roof and rigid waterproof roof, among which roll waterproof roof mainly uses SBS modified asphalt waterproof membrane in construction. It should be noted that paving should be reasonably determined according to different types of roofs such as flat roofs or sloping surfaces, and ensure that the paving is smooth and straight. It is strictly forbidden to have the problem of twisting and wrinkling of rolled materials in the course of paving construction. Roll the process to roll the air under the roll out, and
through the roll to ensure that the roll firm paste. The roof of rigid waterproof layer is a waterproof layer made of concrete pouring and tamping. The key of its waterproof technology is the setting of the isolation layer and the retention of the separation joint, all of which are to prevent the cracking of the rigid waterproof layer. The purpose of the construction of the isolation layer is to separate the rigid waterproof layer from the structural layer, that is, to add a layer of low-strength mortar, coiled material, plastic film and other materials between the structural layer and the rigid waterproof layer to play the role of isolation. The deformation of the structure layer and the rigid waterproof layer is not restrained each other in order to reduce the tensile stress of the waterproof concrete caused by the structural deformation and then the cracking of the rigid waterproof layer. The indwelling of the seams is designed to reduce the cracking of the rigid waterproof layer caused by temperature difference, dry shrinkage of concrete, creep, load and vibration, foundation subsidence, etc. Therefore, it is necessary to protect the isolation layer and the separation layer according to reasonable design requirements and to construct under suitable environmental conditions; from the viewpoint of the detailed structural factors of the roof, roof engineering days gutters, gutters and roofs, drainage gutters and vertical wall junction, drainage cornice, deformation joints, around the pipeline and around the waterfall, and so on are very prone to leakage problems in the later location. Therefore, these locations should be carried out special construction treatment. In the construction process, the key is to use these parts of cement mortar made of circular or obtuse form, and then the end of the coiled material to be treated, generally used to press the strip or gasket fixed treatment and then insert the seal.

3.2 basement waterproofing works

The control of basement waterproof quality, mainly from the basement of the details of waterproof engineering construction technology and materials to analyze its control points. From the detail waterproof layer engineering construction technology, the construction joint is the construction flaw which is difficult to avoid in the concrete construction process and is the important reason which causes the building basement waterproof seepage. According to the current national standard "Waterproof Technical Specification for Underground Engineering" (GB 50108-2008) [2], the main structure of basement should adopt waterproof concrete, and other waterproofing measures should be adopted according to the requirement of waterproof grade. Therefore, the waterproofing grade requirement of the building should be considered before the waterproof concrete floor is poured, and during the pouring process, the continuity of the pouring should be ensured, so as to reduce the artificial construction joint and adopt the construction joint treatment technology in the basement construction process to improve the impermeability of concrete. Deformation joints include expansion joints and settlement joints, when the deformation joints appear water seepage, it will reduce the durability of concrete and affect the function of basement. Therefore, the treatment measures of deformation joints can be treated by filling joints and sealing construction measures. Building basement waterproofing construction usually face more underground through the wall pipeline that’s the reason why need to do waterproof measures. The casing is embedded in the location of the pipe through the wall, and the sealing ring is welded to the casing, and the modified asphalt soft sealing material is injected into the casing to prevent water seepage and ensure the concrete vibration and compactness at the location of the pipe through the wall, etc. In the construction of concrete wallboard structure, tension bolts are used to fix the formwork. In the construction process of basement wall panel, in order to solve the hidden danger of water seepage caused by the use of bolting through the wall, one-time waterproof bolts can be applied to the formwork of the outer wall of the basement, and the gap of the left and right depth of 40mm can be chiseled at the root of the bolt after the external wall bolt is removed the template. The bolts are burnt by gas welding and the notch is compacted by waterproof mortar, so as to ensure that there is no leakage of electricity and achieve waterproof effect. From the material aspect, the material is the waterproof foundation [3]. When making the outer waterproof layer, under the condition of satisfying the construction environment, a series of problems should be considered, such as the joint problem of the waterproof layer, the
bonding problem, the choice of waterproof material, and so on.

3.3 Waterproof works in toilets, baths and kitchens
The toilet bathroom, kitchen and so on place are the people daily life area. Up and down water pipelines, heating, natural gas pipelines and so on are concentrated in these parts and compared to the bedroom, living room, toilet bathroom in most families, kitchen area is smaller. Therefore, according to toilet bathroom, kitchen area is small, node complex characteristics. The flexible waterproof coating with continuous film-forming and flexible operation can be used in the aspect of materials. But in the construction should pay attention to the thickness of the waterproof coating and painting time, because it is an important condition to ensure the quality of the project, so the thickness of the coating can’t be adjusted at will, the coating waterproof layer must be installed in the pipeline and the pipe hole around the plugging to start work, smear must be applied to the wall and at least higher than the ground 150mm. Of course, you can also use waterproof membrane, but the use of waterproof membrane should be relatively light and thin and has a good adhesion with the base materials, and to prevent the occurrence of hollowing.

4. Summary
To sum up, building waterproofing is a complex project. No matter in the process of construction or in the selection of materials, it is necessary to deal with and arrange seriously in order to ensure the quality of construction and the waterproof effect of the building will directly affect the safety of people's life and property. Therefore, it is important to strictly control the key points of the quality control of the building waterproofing engineering in order to make the quality and safety of the building reach the standard.

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