

# Difficulty Analysis of HVAC Construction and Key Analysis of Improved Technology

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**Abstract:** This paper expounds the concept of HVAC construction, specifically analyzes the current situation of HVAC construction in construction engineering, and focuses on the key and difficult points in HVAC construction. In order to provide an effective reference for improving the quality of HVAC construction in the current construction engineering, some suggestions are put forward for improvement of relevant technologies involved in key and difficult points.

**Keywords:** HVAC construction; Key and difficult points; Current situation analysis; Technical improvement; Air duct installation

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## Preface

In the construction engineering, the HVAC construction is the essential construction link, and also the key construction link to realize the building function and meet people's demand for building quality. HVAC construction has high technical requirements, and the influencing factors of HVAC construction quality are also diverse. Therefore, in order to effectively improve the quality of HVAC construction, it is necessary to analyze the construction difficulties. On this basis, the relevant construction technology is improved to ensure the quality of HVAC construction.

## 1 HVAC construction concept

The so-called HVAC construction refers to the

construction of some functional systems in the construction engineering. This includes heating system, air conditioning system and ventilation and smoke control system. In the normal use of the buildings, these systems have played a role in strengthening the building function, improving the building quality and increasing the building value. In addition, the quality of these systems is also the focus of close attention for every user. Although the importance of these functions determines the important position of HVAC construction in construction engineering, it is a subsidiary project after all. It needs to be built on the completion of other parts of the project. Therefore, the personnel in charge of HVAC construction must communicate effectively and closely with other engineering construction personnel, so as to ensure that appropriate positions can be reserved for HVAC construction during other engineering construction. Therefore, the construction schedule must be strictly followed to ensure the smooth development of the whole project construction. At the same time, the HVAC construction must be carried out in strict accordance with the relevant standards and specifications, so as to ensure that the HVAC construction quality is up to the standard<sup>[1]</sup>.

## 2 Analysis of HVAC construction in current situation

Through the brief summary of HVAC construction, we can see the important role of HVAC construction in the current development of the construction industry. It not only affects the quality of the construction project, but also affects the comfort and economy of the building to a great extent. At present, there are still some problems

in HVAC construction, which affect the quality of HVAC construction, and restrict the development of the

construction industry. See the following table for the specific status analysis:

**Table 1.** List of HVAC construction status

Problem Type	Problem Description
Problems of construction materials	Construction materials have always been a direct factor affecting construction quality. At present, with the development of market economy, a variety of new materials continue to flow into the market. Moreover, a variety of material models, materials and so on add a certain degree of difficulty to the construction unit in material selection. Often because the market research work is not done in place, or in order to save costs, we choose materials lower than the standard of construction design for construction. These have a serious impact on the overall quality of the project.
Problems of construction technology	There are many technologies involved in the HVAC construction, such as the straightening of pipes, the slope of pipes, the setting of pipe supports, and the control of the height and spacing of pipe supports. These all need relevant precision technology. Once the technology is not up to the standard, it will cause a serious impact. A little carelessness will lead to some heat preserved failures in the use process, greatly reducing the heat preservation effect <sup>[2]</sup> .
Problems of construction survey	There are many operations that need to be measured on site in the HVAC construction process. Most of them are measured by people. There are many factors that affect the measurement results. For example, the technical level of the surveyors themselves, the attitude and responsibility of the surveyors towards the work, etc. will cause the deviation of the measurement results. If the deviation exceeds the allowable range, it will have a great impact on the project construction.

### 3 Analysis of difficulties in HVAC construction

#### 3.1 Ventilation construction

##### 3.1.1 Reserved holes

In some HVAC construction, the problem of neglecting the reserved holes often occurs. Although the reserved holes will be marked on the construction design drawings, it is difficult for the construction personnel to identify the specific location of the reserved holes in the actual construction. Therefore, the construction personnel often misjudge the position of the reserved holes during the construction, and even some construction personnel directly ignore the reserved holes <sup>[3]</sup>. In the process of the construction, the constructors need to communicate with the designers effectively before construction. This can clearly make the reserved holes basically meet the design requirements and construction requirements. At the same time, the whole project should be checked specifically, and the existing problems should be corrected in time.

##### 3.1.2 Placing concrete

Concrete pouring is also a very key link in the HVAC construction process. It must strengthen the attention to this link from construction personnel, and check in real time in the process of concrete pouring. If any problem is found, it must be treated and improved in time to prevent the treatment difficulty of concrete solidification due to delayed treatment. In addition, in

the process of concrete pouring, it will contact with many pipelines. Thus the pipeline is often damaged due to mistakes, which affects the progress of other projects. Hence, corresponding protective measures must be taken to ensure that the concrete pouring can be carried out smoothly without damaging the pipeline.

##### 3.1.3 Installation of exhaust pipe for bathroom

The bathroom is the place with the highest frequency of water use, especially in the process of bathing, the water vapor is very large, and some residents will use gas to heat water for bathing. In this way, the indoor air will be mixed with carbon monoxide in varying degrees. Therefore, the installation of exhaust pipe for the bathroom is very important for the daily life and even personal safety of residents. When installing the exhaust pipe, the pipe corner to be turned can be set to the angle 45 °, and the control valve of the air outlet and the water collector can be set to the same direction. In this way, it is better for problems to be found and get repaired in time.

#### 3.2 Floor heating construction

At present, in the construction engineering, most of the floor heating construction is carried out by using the low-temperature hot water heating system. In the construction of this heating system, we need to pay more attention to many aspects to ensure the quality and safety of the construction: 1. when going on the laying work, it is best to select the materials with

safe and reliable quality that meet the standards for the laying of the sub-floor of the geothermal pipe. Generally speaking, aluminum foil thermal reflective film is adopted. During installation, it must be installed according to the correct process flow. Of course, if the plastic extruded plate can be used for installation, its performance and quality are much higher than the aluminum foil thermal reflective film. However, its cost is also high, and it can be selected according to the actual situation. 2. It is better to make the bathroom highly waterproof. The floor heating construction of the bathroom is different from other parts because of the higher water consumption rate of the bathroom. If the waterproof work is not done well, the floor heating will be affected due to water leakage. Therefore, in the floor heating construction of the bathroom, a waterproof layer should be added between the geothermal layer and the concrete layer to protect the heating system from water leakage. 3. Before heating, a comprehensive inspection of the heating system is carried out to ensure the smooth heating. In the process of concrete pouring, it is necessary to protect the corresponding pipes, especially the junction of the water distributor and the pipe tray, and take corresponding protective measures in the concrete pouring [4].

## 4 Key analysis of HVAC construction technical improvement

### 4.1 Improving the installation technology of air outlet

There are two aspects to be considered in the installation process of air outlets. One is to ensure that the functionality of air outlets meets the requirements; the other is to ensure that the installation of air outlets can be reasonably matched with the surrounding environment. Therefore, in the process of installation, it is necessary to fully analyze and reasonably set the position and direction of the air outlet. It is necessary to combine the various shapes of air outlets, such as

louver type air outlets, spherical spray air outlets, swirl air outlets, etc. Finally, a relatively perfect air outlet conforming to the related requirements is designed after combining various factors. For example, when designing and installing the air outlets of different functional rooms in buildings, the actual functions of each house should be fully considered. In terms of design style, it should be coordinated with the overall interior style. In addition, after the completion of the construction, the extra reserved holes shall be blocked to prevent the impact on the air amount in actual use.

### 4.2 Improve the installation technology of air duct

1. Installation method of air duct. When installing the air duct, it must be installed in strict accordance with the relevant technical specifications. The main and branch pipes can be connected on the ground in advance. According to the requirements of actual installation, the branch pipe is generally about 10 m long. The air duct is connected with the equipment interface flange according to the drawing. The thickness of the gasket should be between 5-8mm [5]. Before installation, the support and hanging bracket shall be inspected to ensure that the support and hanging bracket are installed accurately and firmly.

2. Technical requirements for air duct installation. In the installation of air duct, no transverse joint seam is allowed, and the longitudinal joint seam must also be staggered. If a transverse seam is produced, it should also be welded flat with tin. For example, when the rectangular air duct is installed horizontally, the relationship between the bottom width and the bottom flat joint seam is shown in Table 2. The deviation of installation shall be strictly controlled. See Table 3 for the control range of the deviation. If the humidity of the air reaches more than 60%, the inclined drainage device shall be set, and the slope shall be set at about 0.01-0.15 degrees.

**Table 2.** Setting of bottom longitudinal joint seam for horizontal installation of air duct

Bottom width of air duct a(mm)	Longitudinal joint seam at the bottom of air duct b(pieces)
$a \leq 900$	$B=0$
$900 < a \leq 1800$	$b \leq 1$
$1800 < a \leq 2600$	$B \leq 2$

**Table 3.** Allowable deviation value of air duct installation

Direction	Deviation per meter a(mm)	Total deviation b(mm)
Horizontal	$a \leq 3$	$b \leq 20$
Vertical	$a \leq 2$	$b \leq 20$

### 4.3 Improving the construction technology of heat preservation

Heat preservation construction is the key to the normal operation of HVAC engineering. One of the key factors affecting the quality of heat preservation construction is the construction technology. If there is no high-level technical support of heat preservation construction, it is difficult to achieve the proper heat preservation effect. In serious cases, a certain amount of condensate will be formed during the operation of the HVAC system, which will affect the normal operation of the system. In the process of construction, the most difficult part is the construction of water system. This part of the construction requires a high degree of fineness, and a little carelessness will lead to failure. Therefore, the construction personnel should strictly follow the construction drawings while improving their own technical level. At the same time, we strengthen the quality and safety supervision of the construction site to ensure that problems can be found and solved in time, so as to prevent rework due to unqualified quality in later stage. In addition, it is necessary to ensure that the thermal insulation layer can reach the standard coverage degree while the technology is up to the standard, so as to improve the heat preservation effect.

### Conclusion

To sum up, HVAC construction is the key link in the construction project, and its construction quality directly affects the normal use of the building. Therefore, relevant construction units must pay more attention to HVAC construction. The key points and difficulties are analyzed in the HVAC construction process, and the construction technologies involved in these key points and difficulties are improved and perfected, so as to improve the construction quality of HVAC construction and promote the healthy development of the construction.

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