Chapter 12

DESIGN THE AIR DUCT SYSTEM

12.1 ABOUT OVERVIEW OF AIR DUCT SYSTEM:

12.1.1 Air duct:

The air is a device that plays a connection between a cold and harmonic space, the air transport duct that is healed to air conditioner, the air duct system consisting of several paired tubes with each other, with or without a branch, the duct interface can be rounded, rectangular, square or any other.

In the system we use the fan to do the air moving, there are two types of fans Is: Centrifugal fans and axial fans.

Ducts transport cold air from the refrigerator to the space required to call the exhaust or supply duct.

Air duct from space to air conditioner return to the refrigeration called the circulatory duct or supply duct.

The duct used to waste an air intake called exhaust duct.

Duct materials are usually corrugated or coated with thick zinc From 0,5 ÷ 1.5 mm. These duct are coated with thermal insulation (either in addition or in), the outer aluminum resistant aluminium.

12.1.2 Air grill, air grill suction:

The air grill is the ultimate device on the duct that provides the task of delivering and diffusing the wind into harmonic space, distributing both air in the room. After that the air is inserted through the mouth suction refinishing on the air processing device.

The air grill and suction air grill is split up various types depending on the shape, installation position, use and air distribution effect, air speed...
* Types of air grill:

- Air grill ceiling: this type should only be used for the ceiling from 2.6 m to 4 m, which can be used as a grill.

- Mounted air grill recording wall: mounted on the refrigerating floor or wall markers, often the length is greater than height. The exterior is framed with vertical bars, with high aesthetics. Can make a grill.

- Air grill spray: use when blowing distances and large working areas (hall, theatre), spray distance can be up to 30 m.

- Air grill floor and bridge elevator are installed under floor or stairs.

- Air grill slot: there are forms of a slot or a lot of narrow-length slots that are larger than the width multiple times. Mounted on the ceiling.

- Air grill vortex: has the ability to diffuse and blend the air very quickly with the air in the room. Mounted ceiling and mounting floor.

Often for the space to air conditioner, one consistency chooses the elevation of the $H_2 = 1800$ mm To specify the domain where the designer must note ensuring the level of the necessary amenities.

Due to the level of aesthetic perception of each designer and the specific conditions of the building, there are choices options and blow mouth layouts. Here we choose the kind of air grill Chen shaped Square by supplier Catalogue.

**The significance and the importance of the air-level.**

People always breathe atmospheric O2 and waste CO2 so in the environment always need enough O2, the new man feels Good. Lips The air conditioning field is a closed space so there is no natural air exchange so that it would like the O2 to the human exchange, it is necessary to grant a certain fresh wind. How many levels and levels Would.

According to the TCVN, the fresh wind level in the harmonic space needs to reach at least 10% of the total circulatory flow in the room and must reach a minimum of 20 m$^3$/day per person. Want to know density people layout on a square meter how much can reference TCVN on the distribution of density of the Ministry of Construction.

12.2 CALCULATION OF THE DUCT

* The method air duct design:

12.2.1 method of decreasing speed:

Select the speed of air movement on the basis of noise and the activity to reduce the speed in the next duct segments. The designer must have practical experience.

Real methods We:

Choose the speed of air movement in front of duct at cheap branches.

Select the speed descending so that the main duct speed in the duct and next duct.

The selected speed response and a calculated air flow. Calculate the size of each duct.
On a traffic base, speed and duct size has calculated a graph finding the values of pressure loss.

Based on the value of maximum pressure loss calculated according to the longest path we counted, select the Wind fan

12.2.2 method of uniform friction:

Pressure loss calculator on a duct length unit is the same in the entire system. Suitable for low-speed systems, often used to design duct, duct and exhaust duct.

Real methods We:

Select the logical pressure loss value and preserve this value for the entire system, approximately above 1 pas for 1m duct.

Determine the duct size on an already known traffic base in other points.

12.2.3 of static pressure recovery methods:

Determine the following duct size for pressure loss in the tube which is correct by increasing the static pressure due to the decrease in the speed of the air movement after each turn branches.

Requires experience and metrics in selecting loss numbers. Don't use this method to design the duct about.

Implementation methods:

Choose a reasonable speed for the main duct under the table.

Determine the main duct size.

The remaining sizes are determined by graphs (available in documents).

The downside of this method is that the size of the distal exhaust duct segments may be larger than the normal level. Especially for systems with a relatively long duct.

12.2.4 Method T:

Is the method of optimization in designing new air ducts that are developed. The special point of this method is the utmost attention to the issues As: Initial investment costs, operating expenses, energy consumption, operating hours... It is possible to perform calculations according to this method by hand but the calculation is very complex and difficult. Often real Shows on computer computing programs.

12.2.5 method of Constant speed:

The basic content of this method is the choice of 1 most reasonable speed for the entire system.

When doing this method requires that the designer must have a lot of experience.

The constant pressure method is applied appropriately to high-pressure systems. In these systems, prior to the distribution of air in the need for harmonic space people often use the boxes (plenum) to degrade speed and limit the noise level.

12.2.6 method of total pressure:
Is the method of modification on the basis of static pressure recovery methods. This method allows the designer to identify the immediate pressure loss at each point of the duct system.

**Choosing the duct Design method Wind:**

We choose the same friction method to design the air duct, because this method is suitable for low-speed type systems, which are commonly used to design duct, duct and exhaust duct. For the passing duct, this method simultaneously decreases the moving speed of air, this reduces the noise of the system.

**12.3 CALCULATION OF THE FRESH AIR DUCT:**

**12.3.1 Select duct Type:**

In the air conditioning system are surveyed we use the suspension air duct system and are covered by the false ceiling layer.

Duct materials As a zinc, the exterior is coated with insulation.

Duct with rectangular cross-type for easy to build the elbows, the connectors...

**12.3.2 Duct Size:**

For convenience, construction and assembly, duct often be Made into short sections and are assembled together by connecting joints.

**12.3.3 Select the axial fan of KRUGER for fresh wind level for the FCU floors**