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TECHNOLOGICAL EDGE OF AIR CURTAINS

Classification of Air Curtains Based on Flow and Fans Type
Air curtains can be mainly classified into two types:

- a. Recirculating and
- b. Non-recirculating Air curtains

Recirculating Air Curtain gathers and returns the discharged air in the air curtains inlet. The process is continuously repeated with a plenum built into the floor that connects back to the inlet of the air curtain via duct. (as shown in Fig. 5)

Non-recirculating Air Curtain captures fresh air from the environment and discharges it from the unit. Since the same air is not recirculated back, these air curtains can be termed as non-recirculating air curtains.

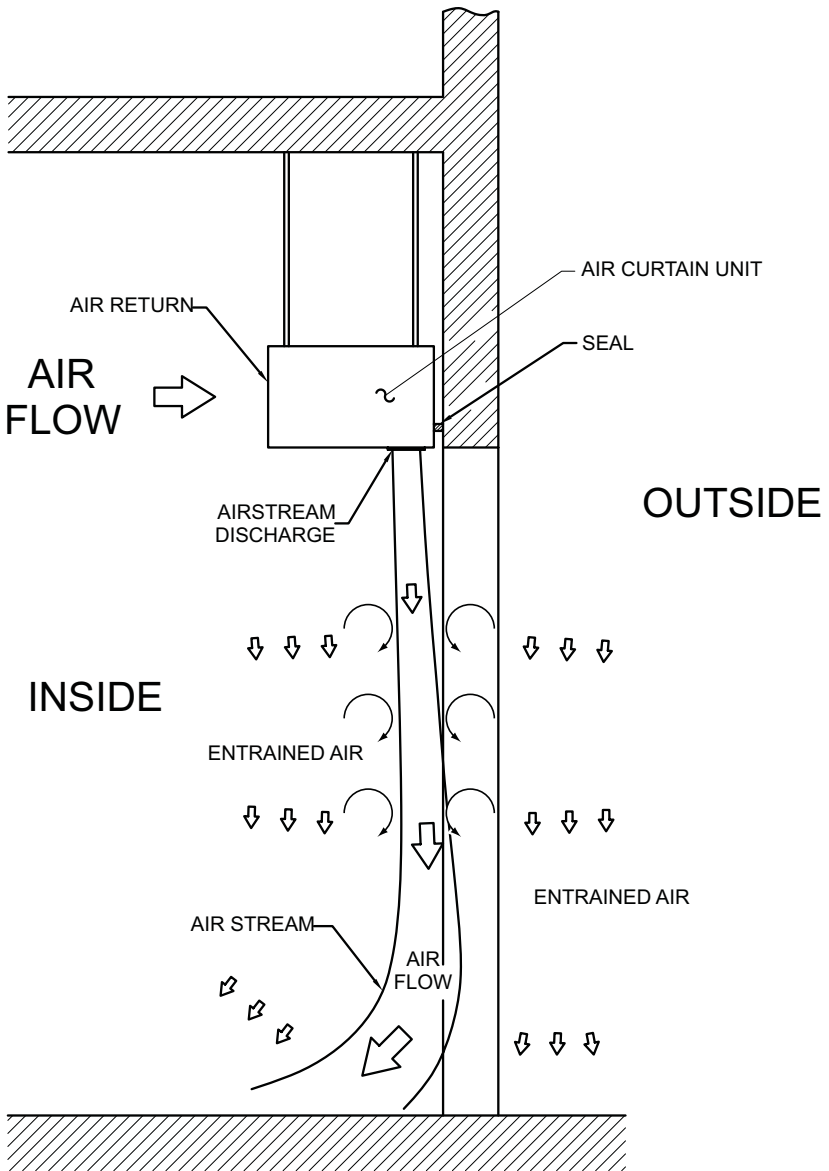


Fig. 13

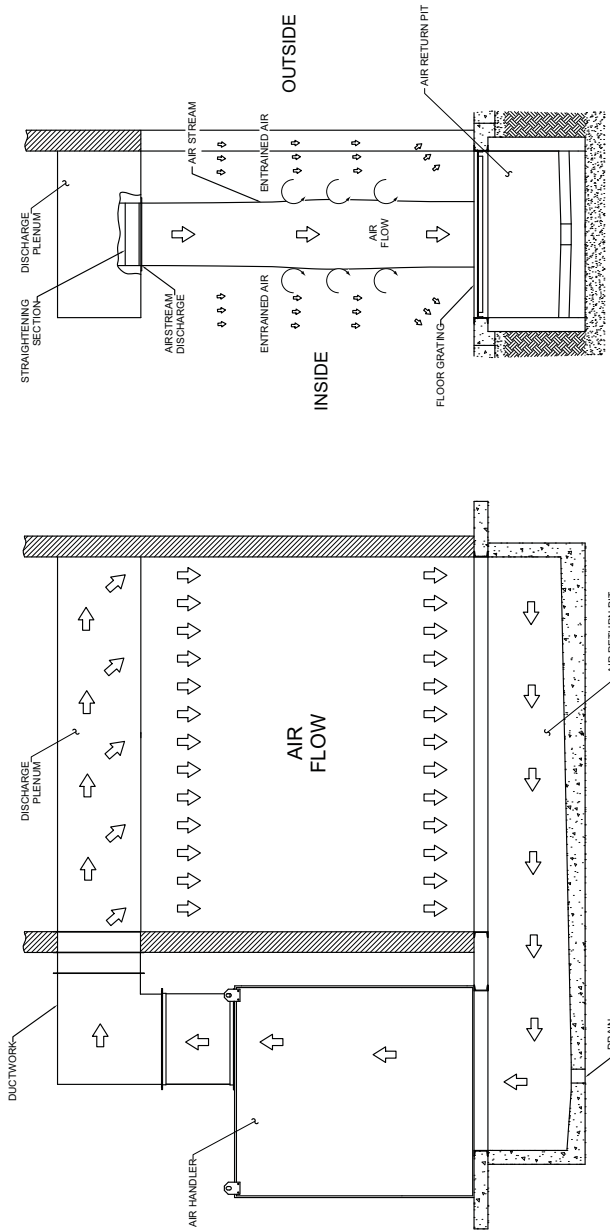


Fig. 14

Recirculating air curtains are more efficient than their counterparts but still, non-recirculating air curtains are more popular. Majority of installations today are non-recirculating due to their cost efficiency and ease of installation.

Directions of Flow:

There are 3 possible directions of blow-out air streams, both for recirculating and non-circulating curtains:

- **Horizontal Mounting from top to bottom:** Horizontal mounting is the most common Installation and most economical way to mount an air curtain. Here, the air curtain is installed horizontally across the top of the opening and the air is discharged from top to bottom of the door.
- **Vertical Mounting from left to right or right to left:** Here, the curtain is mounted perpendicular to the ground and the air is expelled from left to right and right to left. Vertical discharge mostly requires mounting curtains on both sides of the door which adds up the total cost of installation. Normally, this kind of installation is required in places in very wide or high door openings.
- **Horizontal discharge from bottom to top:** This installation is not very common and specially used in case of hot oven applications. The curtain units require special frames and are mounted at the floor level and the installation is carried out under specialized guidance.

Type of Fans

Air Curtains can be designed and manufactured with various types of Fans. Three most commonly used fan types are:

Centrifugal

Most of the air curtain units employ centrifugal fans that use a forward or backward-curved impeller. Centrifugal fans make use of blades to drag air into a circular motion. The pressure of an incoming airstream is increased by blades mounted on a circular hub and alters the direction of the outward flowing air, usually by 90° . Centrifugal fans move air radially and outwards through the vortex housing. Centrifugal fans provide a stronger and more stable air flow than axial fans and therefore, need a higher power input.

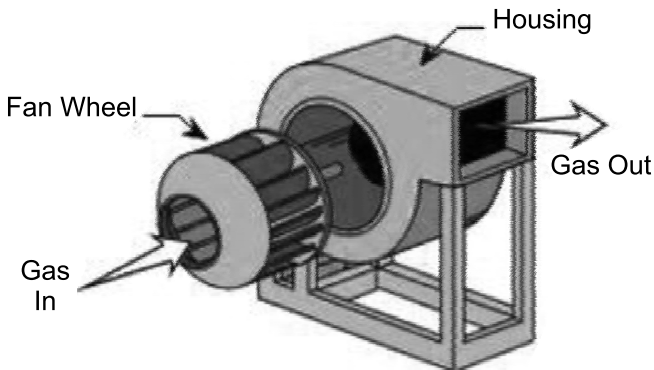


Fig. 15

Axial

As the name suggests, an Axial fan causes air to flow through it in an axial direction. The fan blades rotate around an axis and draw air in parallel to that axis. In other words, the air flows axially in and axially out which forces the air out in the same direction. The fan creates a pressure difference that forces flow through the fan.

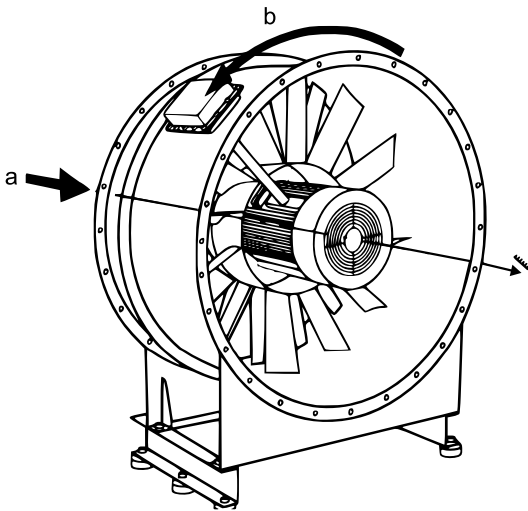


Fig. 16

Axial fans create a large volume of airflow, but the airflows they create are of low pressure. Therefore, these fans need a low power input for operation. There is a wide range of axial flow fans. It may vary from low or medium pressure fans to high-pressure fans. Because of the cool and low-pressure high-volume airflows they create, axial fans are best suited for many general purpose applications.

Cross Flow

Cross flow fans are derivative fans and comprises of housing with a rear wall and a vortex wall. Within that housing, there is an impeller surrounded by forward curved blades. When the air moves through a cross flow fan, it flows transversely and passes through its blades twice.

In Cross Flow fans, the air enters in a perpendicular direction to the motor shaft and is deflected by the fan blades and expelled. These fans have a long, rectangular shape and use either an alternating current (AC) or direct current (DC) motor. These fans are also referred to as tubular fans or tangential fans because of their long and narrow shape and air flow pattern. Unlike centrifugal fans, in cross flow fans the air flows through the fan itself rather than through an inlet. They provide high-pressure coefficient and are preferred for their low noise. The most common application for them is split air conditioner.

All the above types of fan have their own advantages and disadvantages and can be used for different kinds of applications.