

What is an Impeller?

An impeller is a rotating component within a fan or pump, comprising a series of blades that work to increase the pressure and velocity of a fluid, such as air or water. In the context of domestic ventilation, it is the key part of a fan responsible for moving air.

The impeller is the heart of any mechanical ventilation system. It spins rapidly to create an airflow, pulling in stale air from a room and either expelling it outside or pushing it through a ducting system to a heat recovery unit. The design of the impeller is crucial to the fan's performance, determining its efficiency, noise level, and ability to overcome pressure in a ducting system.

There are two primary types of impellers used in residential ventilation:

- **Axial Impeller:** This type of impeller moves air parallel to the axis of rotation. Think of a simple desk fan or an extractor fan in a bathroom. The air is pulled in on one side and pushed out the other in a straight line. They are typically used in applications with low resistance, such as an extractor fan venting directly through an external wall. Due to their simple design and high airflow-to-size ratio, they are common in basic intermittent ventilation systems (like those required in kitchens and bathrooms under **Approved Document F of the Building Regulations**).
- **Centrifugal Impeller:** Also known as a "squirrel cage" or radial fan, this type of impeller draws air in at the centre and expels it at a 90-degree angle to the intake, using centrifugal force. These are highly effective at moving air against resistance, making them ideal for systems with longer duct runs or more complex layouts, such as a whole-house Mechanical Ventilation with Heat Recovery (**MVHR**) system. Their design allows them to maintain consistent airflow and pressure even when faced with resistance from filters, bends, and ducting.

For example, consider a new kitchen extension in a UK home. The extractor fan specified by the building regulations (**Approved Document F, Volume 1: Dwellings**) needs to have a minimum extract rate. A simple, wall-mounted axial fan might be sufficient if it vents directly to the outside. However, if the design requires the fan to be ducted to a roof tile vent, a more powerful centrifugal fan might be needed to overcome the pressure loss and still meet the required airflow rate.