

What Are Shaded Pole Induction Motors? 2022 Ultimate Guide

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The shaded pole induction motor is a split-phase type single-phase induction motor. The shaded pole motor is very popular for ratings below 0.05 HP (~ 40 W) because of its extremely simple construction. This motor is self-starting with one of the poles shaded by the copper ring. This simple, maintenance-free, and low-cost motor is generally being used in a wide variety of small power applications.

The shaded pole induction motor is a self-starting single-phase induction motor with a copper ring shading one of the poles. Because of its proper concept, the shaded pole motor is highly common for ratings below 0.05 HP (40 W). Shaded Pole Induction Motors is an important **Product** for industrial applications. Shaded Pole Induction Motors are provided by several **Suppliers and Companies**, different manufacturers, and a lot of distributors and there are a lot of **Shaded Pole Induction Motors For Sale** on Linquip.

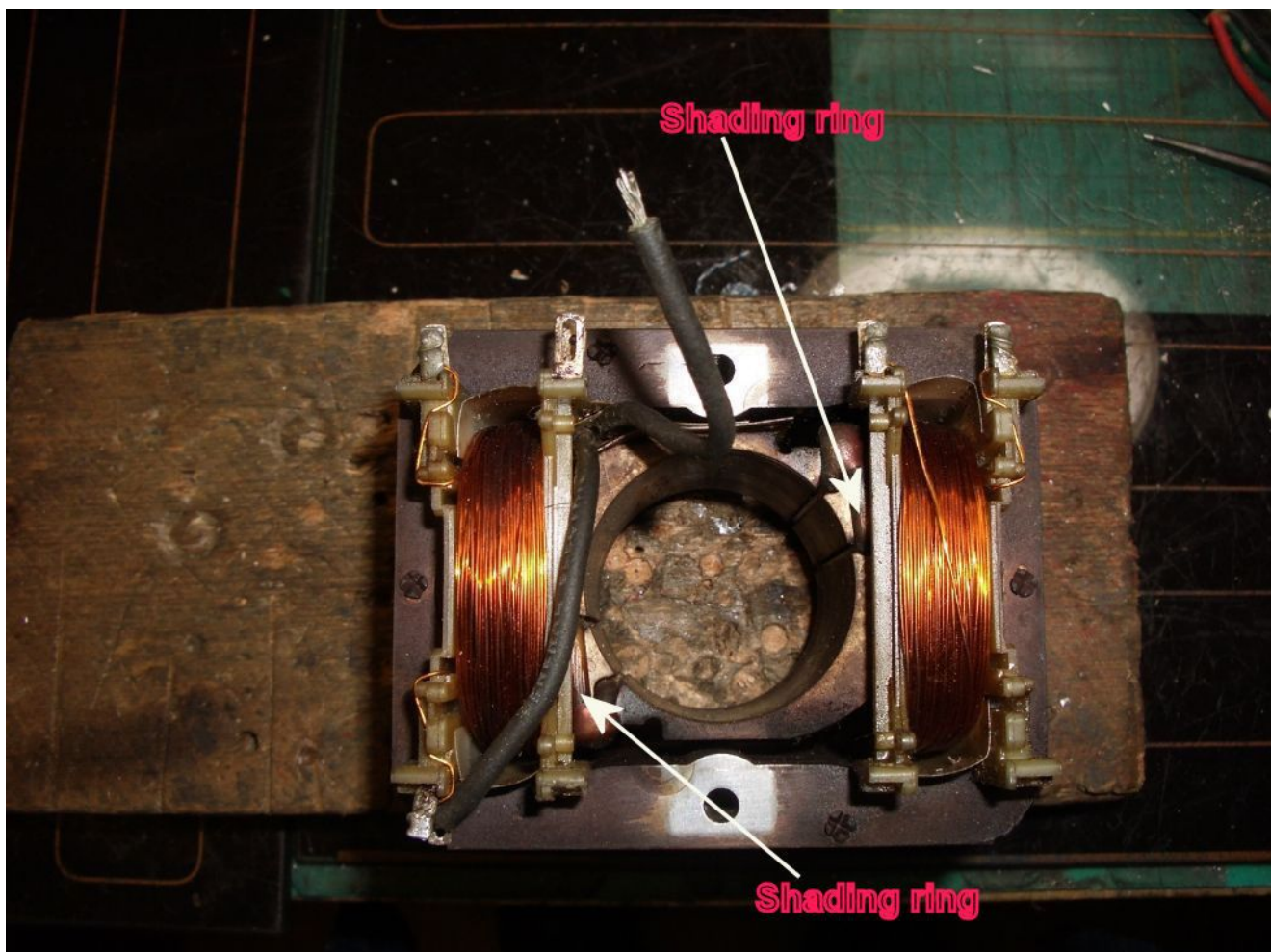
A comprehensive list of Shaded Pole **Induction Motors Services** is available on the Linquip website, which covers all OEM fleets. Linquip vendors can assist you with this. To learn more about how to connect with a wide range of service providers who consistently provide the highest quality goods, please contact shaded pole induction motors experts on Linquip.

In this article, we find the best answer to the question of what are shaded pole induction motors and discuss an overview of this type of AC single-phase induction motor. Follow this new blog in Linquip to find out more.

Construction

To answer the question of what are shaded pole induction motors, first, let us see what are the different parts of this motor. The shaded pole motor may have two or four poles. We discuss the two-pole motor which has simpler construction. Like any other motors, the shaded pole induction motor also consists of a stator and rotor. The construction of the motor is very simple. The shaded pole induction motor has no commutator, brushes, collector rings, contactors, capacitors, moving switch parts. The absence of a centrifugal switch eliminates the possibility of motor failure due to faulty centrifugal switch mechanisms.

- **Stator:** The stator is the stationary part that carries the main winding and shaded winding of the motor. Each of the poles has its exciting coil. Designing a higher number of the pole, increase the complexity of the motor. The poles in the stator are unequally divided into two halves where the smaller portion is the shaded portion that carries a copper band. A copper ring that is also known as a shading coil is fitted on the smaller part. The shading coil fitted on the main pole is called the shading pole. Selecting a 2 poled stator gives a synchronous speed of 3000 rpm while a 4 poled stator speed will be 1500rpm for a 50Hz supply.
- **Copper band:** One portion of each main pole typically 1/3rd will be surrounded by a low resistance copper band. It is called a shade band or shaded coil. Both ends of the copper band will be shorted to form a closed circuit. It acts as a transformer secondary winding. The individual pole has its shade band.
- **Rotor:** The construction of the rotor is the same as the normal single-phase induction motor. The rotor of shaded pole induction motors is the Squirrel Cage type rotor. The rotor bars are provided with a 60-degree skew. This is to obtain an optimum starting torque and for limiting the torque dip during the run-up. Airgap length between stator and rotor is of the order 0.25 to 0.5 mm. A too-short air gap may result in starting-torque variations due to rotor slotting.



Working Principle

The working principle of shaded pole induction motor is simple, the main winding carries alternating current and produces magnetic flux in the stator coil. The same magnetic flux cut by the copper shaded band. Due to this, the EMF will be induced in the copper band. This EMF circulates the current and this current produces its own magnetic flux in the shaded band. By Lenz's Law, the flux in the shade band opposes the main stator flux. It causes a slight magnetic imbalance and generates a rotating magnetic field.

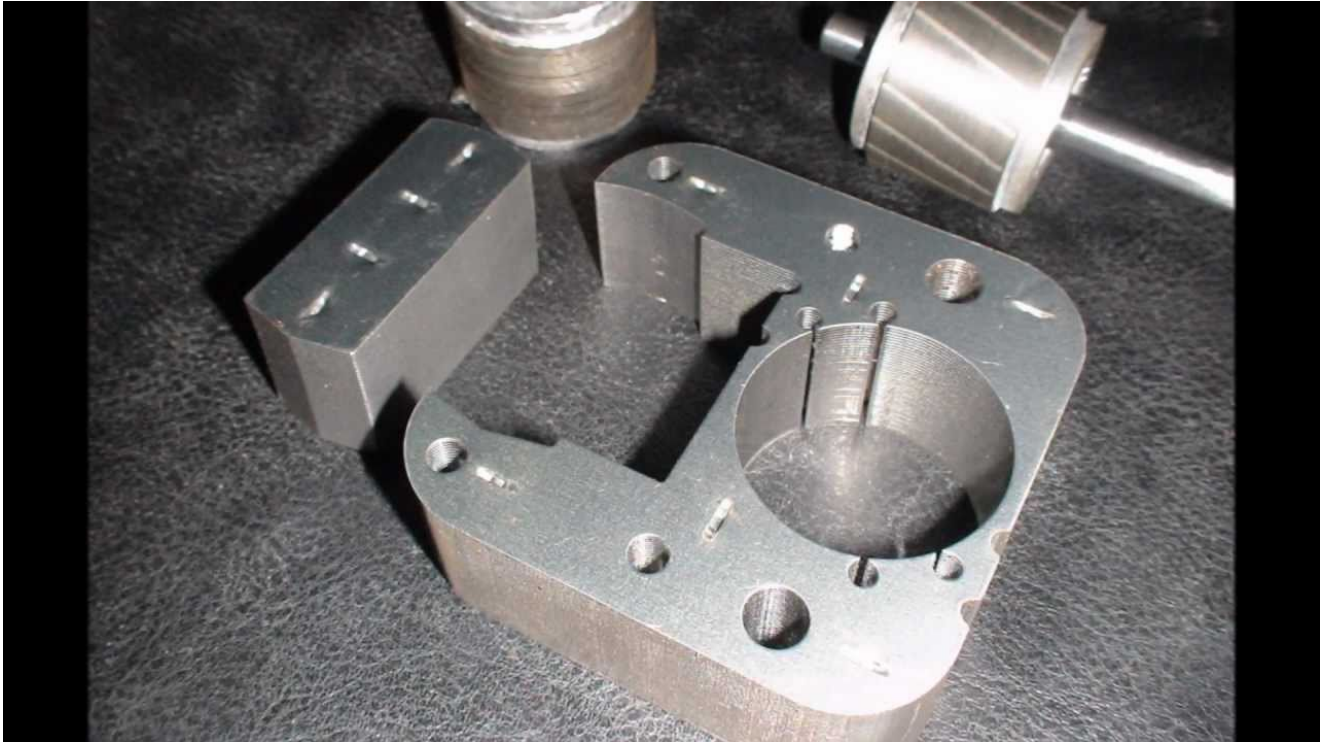
Why Is It Called a Shaded Pole Induction Motor?

The shaded pole induction motor is a self-starting single-phase induction motor with a copper ring shading one of the poles. The shaded ring is another name for the copper ring. This copper ring serves as the motor's secondary winding. They are available in power sizes ranging from 1/4 horsepower (190 W). They are uncommon over 1/3 horsepower (250 W) because alternative designs offer superior qualities for larger motors.

Characteristics

Some of the important characteristics of shaded pole induction motors are given below.

- The speed of the shaded pole induction motor is inversely proportional to the number of poles used in the motor.
- The shaded pole induction motor produces a very small starting torque about 50% of full load torque.
- The efficiency of the shaded pole motor is low because of continuous power loss in the shading coil.
- It is suitable for small devices which require low starting torque.
- The direction of rotation of the shaded pole motor depends upon the position of the shading coil i.e. which half of the pole is wrapped with a shading coil. Therefore, the direction of rotation cannot be reversed unless the machine is constructed in a way that the shading coil can be shifted to another half of the pole.



Power Rating

The shaded pole motor has poor starting torque, the power losses are very high, and the starting power factor is very low. Hence the motor gives us low efficiency for a higher power rating design. That's why the motor is designed with a low power rating typically 1/20 HP. Its design is kept small, and the motor has low power ratings.

Types

The most common type of shaded-pole motor in fractional horsepower use is the squirrel-cage induction motor. This has a rotor that consists of a laminated steel cylinder with conductive copper or aluminum bars embedded lengthwise in its surface, connected at the ends.

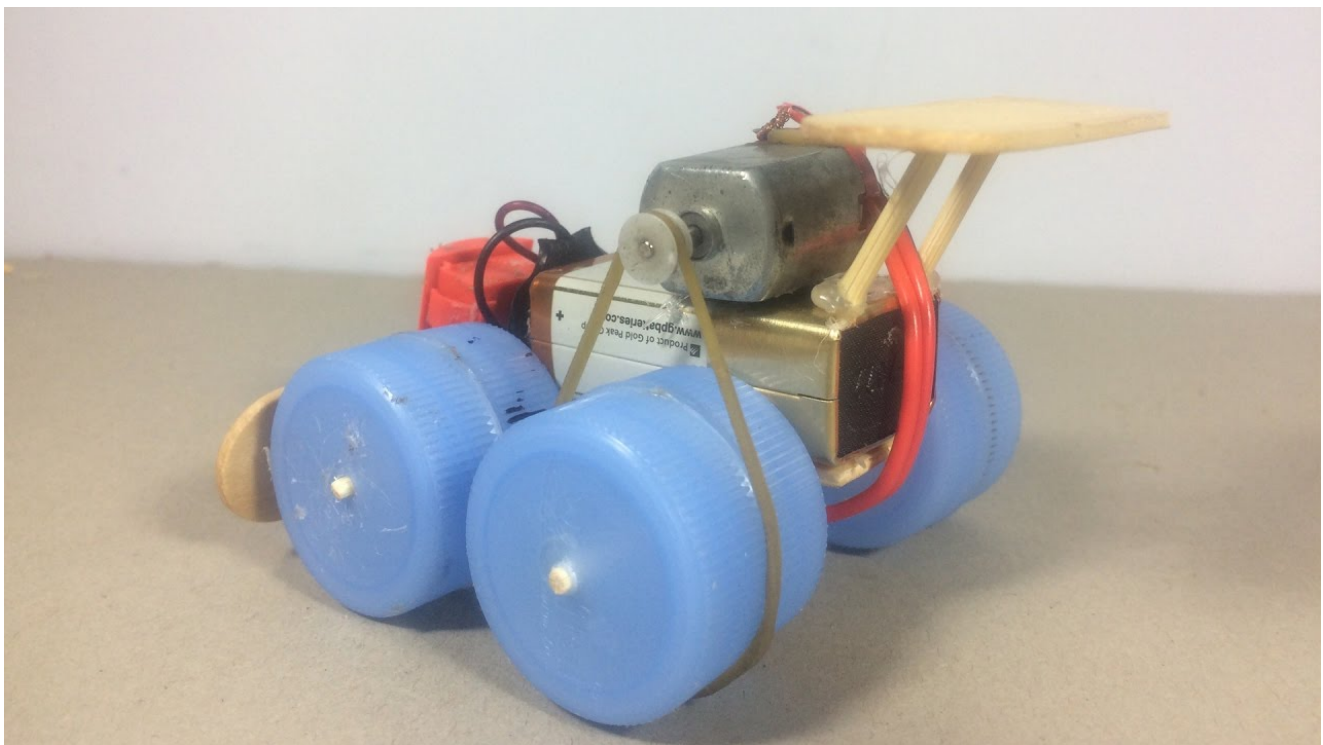
Advantages

- Simple construction
- Reliable
- Long life
- Low cost
- Extremely rugged
- Does not require a centrifugal switch
- Capable of self-starting
- Robust in nature
- Easy to rewind and maintenance-free motors

- Does not require any special starting methods
- Less starting current
- Does not cause a voltage drop across the nearest feeder

Disadvantages

- Low starting torque
- Not suitable for high starting torque application
- Reversing is not possible
- Poor power factor at starting
- Low power factor
- High losses
- Less efficiency
- Very limited over-load capacity
- Efficiency is very low due to copper losses in the shading ring
- The speed reversal is also difficult and expensive as it requires another set of copper rings



Application

Applications are generally in small electrical appliances that require only a few watts of power, for example, for driving heater fans or slide projector fans. In the household appliance market, shaded-pole motors are used in washing machines as discharge pump motors and

cookers as fan motors in large quantities. In ironing machines, these motors are used with reduction gearing for driving the rollers. It finds use for starting electronic clocks and single-phase synchronous timing motors.

The motor is also used in vending machines for driving the fans and in combination with gearing and linkages for selecting and delivering the goods.

Some examples of applications of the shaded pole motor include the following.

- Relays, fans, and other small devices due to their low cost
- Exhaust fans
- Table fans
- Cooling fans
- Humidifiers
- Hairdryers
- Ventilators
- Circulators
- Refrigerators equipment
- Air conditioners
- Small water pumps
- Hot air blowers
- Shower motors
- Toys
- Projectors
- Record players
- Tape recorders
- Advertising displays
- Photocopying machines and many more.

[Click here](#) to know the principle of the shaded pole induction motors to understand more about them.

So, there you have every single fact to the question of what are shaded pole induction motors. If you enjoyed this article in Linquip, let us know by leaving a reply in the comment section. Is there any question we can help you through? Feel free to sign up on our website to get the most professional advice from our experts.

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