Design and development of three phase Blower motor

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Abstract - *This paper summarizes the important thing points for material for blower motors with IP 68 protection for air-conditioned cooling roof-mounted package devices. IP68 protection is used for safety towards continuous submersion in water and entire dust protection. Motor Frame size is used for India standard for blower motor. Insulation material is utilized in H-Class. CRNGO (Cold-rolled non-grain oriented metallic) Steel use in stator and Rotor.*

Key Words: Material Requirement, Classifications of Induction Motor, IP68 Protection.

1. INTRODUCTION

This paper discusses blower motors with IP68 protection to be used in roof-mounted air-conditioned package devices for unique packages. This motor within the three phase AC electric powered motor. This utility is specifically hard because of factors that include environmental situations and voltage source instability. As a result, fantastically specialised design features are required to ensure that their Blower motors reach reliability goals. This Blower motor does advantage from a constant voltage/ frequency supply, results in Constant magnetizing flux stages and pace. In this paper are discusses to enhance motor lifestyles against water safety.

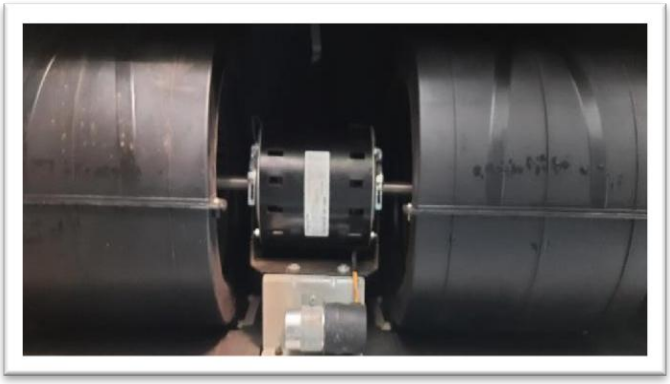

Fig -1: Blower motor.

2.CLASSIFICATION OF INDUCTION MOTOR

2.1 Single Phase induction motor

2.1.1 Split phase induction motor

2.1.2 Capacitor start induction motors

2.1.3 Capacitor start Capacitor run induction motor

2.1.4 Shaded pole induction motor

2.2 Three phase induction motor

2.2.1 Squirrel cage induction motor

2.2.2 Slip ring induction motor

3.INTERACTION BETWEEN MOTORS AND ALTERNATOR

Safe operating speeds are typically pre-defined within the rankings of motors. When operating a special-purpose motor on a variable frequency power, however, several motor and manage pace traits want to be considered. In this case, two blower motor are directly connected to alternator terminals; some objects aren't under manipulate, including manipulate type, acceleration and deceleration time. They don't observe the NEMA utility guide for AC adjustable speed drive systems.

3.1 Motor Speed:

A motor's velocity capability is most usually constrained by means of the mechanical stress limits of the rotating structure. According to obligation cycle of Blower, blower motors paintings extra than 50% at maximum alternator frequency.

3.2 Motor Terminal Voltage Transients:

There are transient voltages or overshoot voltages on the motor terminals, when the motor overload. Significant damage to the motor insulation can arise if those

overshoots are extra than the most rated voltage of the motor. Motors with voltages of 460 or more can also require filters or reactors to reduce the amount of overshoot to a suitable level. There are two primary factors that reason expanded voltage overshoots. These consist of:

a. Short upward thrust times inside the transition of excessive to low voltage on the motor terminals.

b. Long motor leads among the motor and alternator.

In order to avoid voltage overshoots, price and weight issues in blower, the following precautions have to be implemented as required.

a. Motor need to be designed with spike resistant inverter rated winding. Spike resistant cord is used to lessen the outcomes of exceeding the insulation systems Corona Inception Voltage (CIV) ranges.

b. Use the insulation Vacuum Pressure Impregnation (VPI) type. This country of the artwork method is mostly carried out on intense heavy obligation applications.

c. Extend slot insulation to growth the leakage course.

d. Inserted section obstacles among every coil to limit coil to coil breakdown voltage.

e. Motor winding have to be superstar configuration to reduce the volts per turn ability and harmonic modern-day losses.

4. INTERACTION BETWEEN MOTORS AND LOAD

A second crucial consideration within the proper selection of blower motors is the function of the driven load. The loads of packages can be defined by one in every of three types: variable torque, consistent torque, and regular horsepower. The first type, variable torque, is standard for strategies which include fanatics, blowers, and compressors. The torque load in these packages generally varies linearly with pace or with the rectangular of the rate as illustrated in Fig. 2

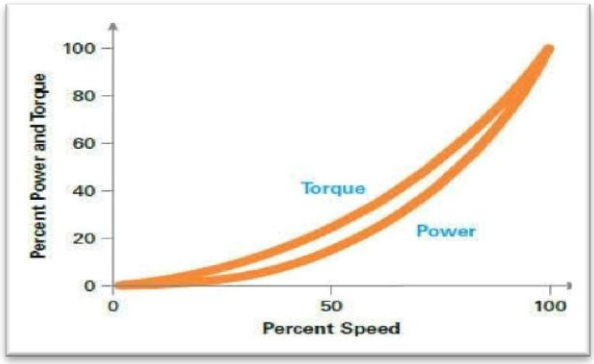

Fig -2: Variable Torque Load Curve

There are 4 sections; loaded on uphill, dumping, unloaded on downhill and loading below the shovel periods. When the blower motor loaded and complete, it usually overload. Blower motors have maximum voltage and frequency. In the dumping duration, the blower motors work with maximum voltage and frequency. When the motor is not any-load blower motors have low voltage and frequency. The blower motors will be shut down throughout the loading. Blower motors must be running greater than 50% at most voltage and frequency. So, the blower motors may be designed at this condition.

The various torque competencies of standard induction motors, denoted by way of Designs A, B, C, and D in NEMA MG1.

Design A and B motors are characterised by using their high efficiencies and low slip. These types of motors are usually utilized in variable torque, constant torque and regular energy packages. Design C and D motors are firstly utilized in packages that require excessive beginning torque. These motors typically exhibit better motor losses and lower efficiency than design A and B. However, layout A and B may be excellent options for blower cars for excessive performance and normal beginning torque.

5. MATERIAL REQUIREMENTS

Following are the motor material required shown in below table,

Table -1: Material Required For Motor.

Sr. No.	Parameter	Material
1	Motor Frame size	63
2	Insulation	H class
3	Copper	Dc
4	Stator Steel	CRNGO
5	Rotor Steel	CRNGO
6	O-ring	Rubber
7	Gasket	Rubber
8	Shaft seal	Elastic Rubber
9	Rubber Diaphragm	Rubber

6.BLOWER MOTOR TORQUE :

4.1 Locked Rotor or Starting Torque

The Locked Rotor Torque or Starting Torque is the torque an electrical motor develops when beginning at zero pace.

A excessive Starting Torque is extra important for application or machines tough to begin - like nice displacement pumps, cranes and so on. A lower Starting Torque can be familiar for centrifugal lovers or pumps wherein the begin load is low or close to 0.

4.2 Pull-up Torque

The Pull-up Torque is the minimum torque developed by means of an electrical motor when it runs from 0 to complete-load speed (earlier than it reaches the spoil-down torque point).

When a motor begins and starts offevolved to accelerate the torque in standard will decrease till it attain a low point at a certain pace - the pull-up torque - before the torque will increase till it reach the very best torque at a higher pace - the ruin-down torque - point.

When a motor starts and begins to accelerate the torque in preferred will lower till it reach a low factor at a sure velocity - the pull-up torque - earlier than the torque will increase until it attain the best torque at a higher speed - the break-down torque – factor.

The pull-up torque can be critical for programs that desires power to undergo some brief boundaries accomplishing operating conditions.

4.3 Break-down Torque

The Break-down Torque is the very best torque available before the torque decreases when the machine keeps to boost up to working conditions.

4.4 Full-load (Rated) Torque or Braking Torque

The Full-load Torque is the torque required to produce the rated power of an electrical motor at complete-load speed.

7.IP PROTECTION :

Ingress Protection rating is an international widespread used to Experience the degree of safety in electric powered enclosures toward intrusion of items, water, dirt.

Table -2: IP68 Protection

IP68	First digit: Solids	Second digit: Liquids
IP	6	8
Ingress Protection	Protection against dust	Protection against water

4.1 O-ring:

O-ring material are use for blower motor is rubber. O-ring are used to dam a direction which can also otherwise permit a liquid or water to break out. The O-ring is placed right into a groove to strong them in region, after which compressed amongst two surfaces

Fig -3: O-ring.

4.2 Gasket:

A gasket is a common term used to describe any seal or grommet that holds two things together.

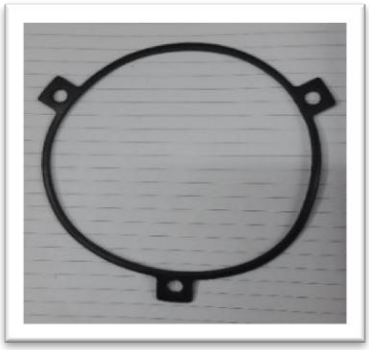

Fig -4: Gasket.

4.3 Rubber diaphragm:

The rubber diaphragms work as a separation wall between the air and the liquid or water.

Fig -5: Rubber diaphragm.

4.4 Shaft seal:

Shaft seal additionally referred to as oil seal, is a aspect assembly that sits across the shaft of the motor.

Fig -6: Shaft seal.

8. CONCLUSIONS

This paper describes the three phase Ac electric motor blower motor for use in roof-mounted air-conditioned package units with IP68 protection for specific applications. As a end result, in particularly specialized design for the ip68 protection and consistent velocity. Increasing the motor existence and water safety.

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