

Insulation class

Stators are wound with insulated copper windings. The materials used for this enamel insulation are polyester, polyurethane, poly vinyl formal etc. The class of insulation classified in accordance with IEC Regulations. The insulation class is dependent on whole insulation system, not just the materials used on the copper windings but also insulation used to protect the windings in the slots of the stator lamination and the material used between phases or winding coils.

The class of insulation falls into four areas of interest, class E, B, F and H. These specify the maximum average temperature, limiting hot spot temperature, and the maximum temperature rise above ambient conditions.

Class of insulation	E	B	F	H
Maximum temperature rise by resistance	75K	80K	100K	125K
Average temperature at 40°C ambient	115°C	120°C	140°C	165°C
Limiting hot spot temperature	120°C	130°C	155°C	180°C

The class of insulation chosen is a technical and commercial decision. The higher the grade of insulation the higher the cost so the motor designer selects based on typical applications and motor temperature characteristics. The Class of insulation does not, on its own, define the maximum ambient temperature for the motor or fan. Based on the above data a motor with class B insulation would indicate a maximum ambient temperature of 40°C (120°C minus 80K = 40°C). However if the fan designer selected a motor for the impeller that resulted in a lower temperature rise in the motor then a higher ambient would result.

The temperature rise within the motor is dependant on the fans performance duty point. Different duty points require different fan powers and therefore different loads on the motor. Increased or reduced loads on the motor output will change the temperature rise within the motor. This can be measured in service by a temperature rise test.



Cutaway of AC induction motor