

Aim: Study Blocked rotor test on induction motor

Apparatus:

3-phase induction motor Digital tachometer

TPST Switch Connecting wires

Three phase variac

Voltmeter

Ammeter

Theory

Blocked Rotor test determines the key equivalent circuit parameters, including stator and rotor resistance R_1 , R_2 and leakage reactance (X_1, X_2)

$$\text{Torque (T)} = \frac{3(I_2)^2 R_2}{s \omega_s}$$

$$\text{Slip (S)} = \frac{\omega_s - \omega_m}{\omega_s}$$

$$\text{Input power } P_{in} = 3 V_L I_L \cos \phi$$

$$\text{Output Power } P_{out} = (1-S) \omega_s$$

Rotor is not allowed to rotate so that the speed of motor rotor is zero RPM slip corresponding to zero speed is unity

V_s	I_L	W_1	W_2	Speed	Total Copper Loss	Rotation Angle	I/P Power
5	0.3	0.77	1.50	0	2.89	29.31	2.27
10	0.7	3.61	7.00	0	12.97	29.31	10.57
15	1.2	9.27	18.00	0	39.06	29.31	27.19
25	1.9	16.48	47.50	0	97.03	29.31	71.74
30	2.3	24.46	68.99	0	138.20	29.31	104.21
35	2.6	35.54	90.99	0	180.94	29.31	137.44
40	3.1	46.87	123.99	0	259.21	29.31	187.28
45	3.5	63.86	157.49	0	324.18	29.31	237.88

Conclusion

We have successfully conducted the blocked rotor test on a three phase induction motor to determine parameters such as stator & rotor resistance and leakage reactance

Precautions

Ensure rotor is securely blocked

Apply low voltage initially

Monitor temperature rise

Use properly rated instruments

Gradually inc voltage