

Fault Zone – Stator

The stator fault zone is often considered one of the most controversial fault zones due to the significant challenge of early fault detection and the prevention of motor failure surrounding the stator windings. Stator windings are the heart of the motor, producing the rotating magnetic field, induction current, and torque to turn the rotor and shaft. This challenge is further intensified in higher voltage machines, where the fault-to-failure time frame becomes much shorter. The stator fault zone is identified as the health and quality of the insulation between the turns, coils, and phases within the slots and end turns of the electric motor.

Turn-to-turn or phase-to-phase shorts can be catastrophic to the motor and not necessarily be detected by the standard megohmmeter. Excessive inductive imbalance, resistive imbalance, vibration, partial discharge, or poor insulation quality can lead to stator failure and should be monitored regularly to prevent a shortened life of the electric motor stator. Stator analysis using EMAX technology is performed by evaluating the phase relationship of voltage and current for each of the three phases of an AC induction motor.

High current imbalance with a high impedance imbalance points to stator fault.

Phase	Real	Imaginate	Angle
Phase 1	1.6	12.5	88.4
Phase 2	3.75	16.65	87.5
Phase 3	2.11	16.39	87.99
% Imbalance			43.46

What the RIC will look like.

Parameter	Value	Unit
Test Date	4/1/2002	
Test Time	11:52:46 AM	
Motor Load	Administrator	
Frequency	1200	Hz
Charge Time	60	min
Voltage	500	V
Motor Temp	15	°C
Measured Mohm	1900.00	> 2000
Corrected Mohm	336.00	> 2000
pF Ph 1 to 2	0.04550	0.14550
pF Ph 1 to 3	0.04650	0.14450
pF Ph 2 to 3	0.04600	0.14550
mH Ph 1 to 2	4.250	14.000
mH Ph 1 to 3	5.145	8.265
mH Ph 2 to 3	4.200	9.030
Average Inductance	4.532	8.432
% Res. Imbalance	1.09	1.86
% Ind. Imbalance	13.53	66.04

% Resistive and Inductance Imbalance trending higher indicates a loss of turns.

The MCEMAX powered by MCEGold™ provides a Fault Zone Report, which is a one-page summary of the test results relevant to the six fault zones. The Fault Zone Report may be reached directly through the Fault Zones icon on the toolbar.

Condition Code	Test Type	Date	Condition Code
Power Circuit	Voltage Imbalance (%)	0.13	3142000 5:10:41 PM
Power Circuit	Phase Inductance (%)	0.29	3142000 4:37:20 PM
Power Quality	Voltage THD Ph-Ph (%)	1.31	3142000 5:10:41 PM
Power Quality	Current THD (%)	1.54	3142000 5:10:41 PM
Power Quality	IRMP (%)	0.01	3142000 5:10:41 PM
Insulation	RTG (Mg)	191.00	3142000 4:37:20 PM
Insulation	PI	2.13	3142000 4:50:41 PM
Insulation	CTG (gF)	79000.00	3142000 4:37:20 PM
Stator	Imp. Imbalance (%)	43.46	3142000 5:10:41 PM
Stator	Inductive Imbalance (%)	26.58	3142000 4:37:20 PM
Rotor	F _a Amplitude (Delta dB)	68.29	3142000 5:09:10 PM
Air Gap	Eccentricity		
Air Gap	Peak One (Delta dB)	Not Tested	
Air Gap	Peak Two (Delta dB)	Not Tested	
Air Gap	Peak Three (Delta dB)	Not Tested	
Air Gap	Peak Four (Delta dB)	Not Tested	
Air Gap	RIC (Counts/Ph)	Not Tested	