



DC STEP VOLTAGE TEST

IDENTIFIABLE FAILURE MODES

- Surface contamination to stator and rotor windings.
- Embrittlement to stator windings.
- Uncured resins and varnishes.
- Delamination and voids
- Moisture absorption

DESCRIPTION

The Step Voltage test records the peak in-rush and decay of current as each increase (step) in DC voltage is applied to the circuit. The test allows the technician to observe how the insulation system responds to an over-voltage stress. The standard procedure is to increase voltage in one-minute increments. The leakage current is plotted against the stepped DC test voltages. Insulation condition is determined by evaluating the resultant graph of leakage current. Healthy insulation can be expected to withstand over-voltage stress. With each increase in applied voltage, leakage current will increase proportionally. Deteriorated insulation, however, exhibits an abrupt increase in current passing to ground as the higher voltages exploit structural flaws. The test can be applied to stator and rotor windings on asynchronous motors, stator and rotor windings on synchronous motors and the armature and field windings on DC motors.

ANALYSIS APPLICATION

Since the results are comparative, temperature correction of the RTG values is not required.

A clean, dry, healthy insulation system should have a linear leakage current for the increase in voltage over the time of the test.

Moisture and dirt contamination is usually evident throughout the full test with insulation flaws and mechanical damage evident as the test voltage reaches its higher values.

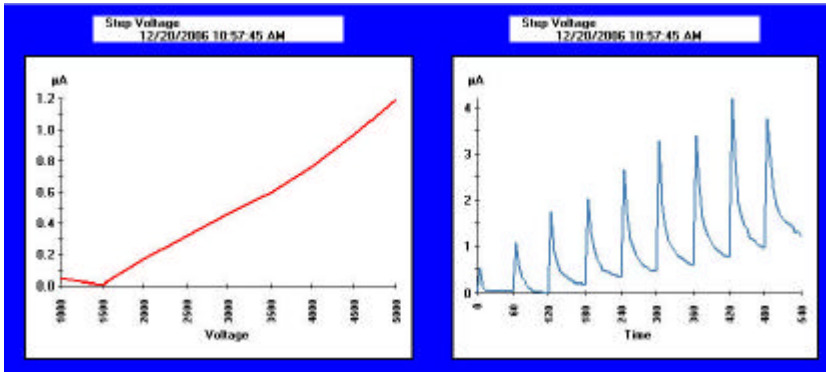
Consideration should be given to the construction, insulation type and age of the insulation system when interpretation of the test results is carried out.

For identical motors with the same winding parameters (age and insulation type) the test results can be used comparatively to determine any potential failure mechanisms.

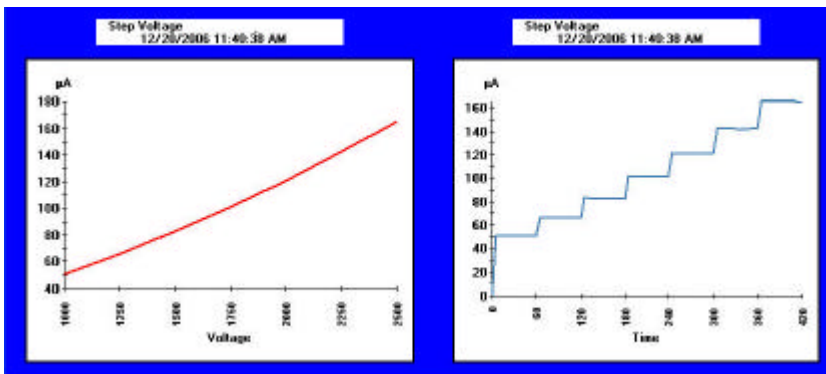
Power factor capacitors, surge arrestors and supply cables should be disconnected from the motor terminals for this test to be carried out.

APPLICABLE STANDARD / ACCEPTANCE CRITERIA

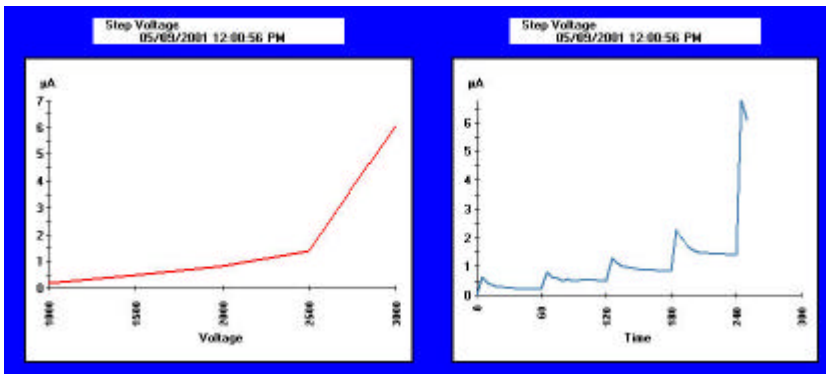
The referenced standard for Step Voltage testing is IEEE 95-2002



Satisfactory step voltage test



Step voltage test indicating contamination to insulation system.



Step voltage test automatically terminated due to sudden increase in leakage current due to cracked terminal block.