



Application: Motor/Generator Withstand & Diagnostic Testing

Application Overview

AC Withstand testing is one of the more important tests to a motor or generator coil. Only this test, using AC high voltage, can truly verify the integrity of the coils as they are stressed similarly to operating conditions. This test applies an over voltage to the coil from 1.5 U_o – 2.5 U_o, per the test standard, for 60 seconds. It is a simple pass/fail test, where the coil either holds the voltage or fails/arcs should there be a defect. It is a “destructive” test to defects that cannot hold the test voltage but has no harmful effects on the insulation where it is not defective. Only significantly degraded insulation will be driven into partial discharge under the test voltage until failure occurs. “Good” insulation will remain dormant during the test.



Diagnostic testing can also be performed, namely **Tan Delta/Power Factor** and **Partial Discharge** testing. These instruments are connected to the output of the AC hipot to record the test data, while overvoltage testing. A good use of these tests is for **stator bars**, either tested individually, several at a time, or the entire coil at once, depending on how powerful an available AC hipot is. (DC voltage is sometimes used for withstand testing but is less effective on coils than AC, as the DC voltage does not evenly stress all turns and the leakage current readings can be overly interpretive and not an accurate measure of insulation quality.)

When AC voltage testing, the current draw from highly capacitive loads can be very high. The mAac current, or the kVA, required from the test set must be figured. To find out, refer to past similar tests, or test at lower voltages and linearly scale up the mA's, or calculate the capacitance. If the capacitance is known, calculate the amps needed.

Amps = 2πfCV f = frequency in Hz C = load capacitance in farads V = test voltage in volts

HVI Product Solutions

HVI AC Dielectric Test Sets: The models shown are designed to test motors & generators (and many other types of apparatus) with line input voltage ratings from 2.4 kVac – 25 kVac. Their load capacities are based on capacitive values commonly encountered. Many more models are available in many sizes and control configurations. For testing very high uF loads, like generators and transformers, Resonant technology is available.

PFT Series Standard AC Hipots



10 - 100 kVac

HPA Series: Up to 40 kVA - Enhanced Controls - Custom Made - Low PD Output

Test Coils Rated 15 kV
PD <5 pc



0 – 50 kVac @ 150 mA, 7.5 kVA

Traction Motor
AC Testing

0-3 kVac, 1 A
0-5 kVac, 1 A



Test Coils
Rated 5 kV

0–10 kVac, 1 A
Auto Controls



FPA Series Mobility

Test Stator Coils
rated to 6 kVac

0 – 6.0 kVac @ 1.0 A
0 – 12 kVac @ 0.5 A



HPA Series Test Coils rated 25 kVac

0 – 30 kVac @ 0.67 A
0 – 60 kVac @ 0.33 A
Corona free



Very Low Frequency AC Hipot & Tan Delta AC Withstand & Tan Delta/Power Factor Testing

VLF Series

Test up to 15 kV
coils with VLF

0 - 34 kVac VLF
0.1 Hz @ 1.0 uF



VLF AC Hipots output 0.1 Hz instead of 50/60 Hz. At 0.1 Hz, it requires 600x less current to test a motor or gen. The use of VLF for high voltage testing rotating machinery is defined by **IEEE433-2012**.

PTS Series

DC Voltage Testing
Hipot/Megohmmeter
37.5 kVdc – 600 kVdc



