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 Uo – 2.5 Uo, 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.

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\text{Amps} = \frac{2\pi f CV}{C} = \text{frequency in Hz} \quad C = \text{load capacitance in farads} \quad V = \text{test voltage in volts}
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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.