

ANALISIS PERCEPATAN PENUAAN ISOLASI AKIBAT PENGARUH KELEMBABAN DAN KONTAMINAN PADA MOTOR INDUKSI BERBEBAN

Nama Mahasiswa : Dapis
NRP : 2213201202
Pembimbing : Dr. Dimas Anton Asfani, ST, MT.
: Dr. Eng. I Made Yulistia N., ST, M.Sc

ABSTRAK

Kerusakan motor induksi merupakan masalah yang serius dalam dunia industri. Salah satu penyebab kerusakan tersebut ialah penurunan kualitas isolasi. Pembebanan terus-menerus dan faktor lingkungan seperti pengaruh kelembaban dan kontaminan dapat mempengaruhi penurunan kualitas isolasi (*deterioration*). Meskipun isolasi dirancang mampu bertahan dari tekanan (*stressed*), namun tekanan berlebihan akan mempercepat penuaan isolasi. Hal ini menyebabkan kinerja motor menurun sehingga mengganggu proses produksi dan menambah biaya *maintanace*. Oleh karena itu, percepatan penuaan isolasi motor harus diantisipasi sedini mungkin. Pada penelitian ini, eksperimen percepatan penuaan isolasi motor induksi dilakukan dalam keadaan berbeban dengan pengaruh kelembaban tinggi dan efek kontaminan. Metode yang digunakan untuk mengevaluasi kondisi motor adalah *polarization index* (PI), tes respon osilasi (*surge test*) dan pengukuran *LCR meters*. PI digunakan untuk mengetahui nilai indek polarisasi dan tahanan belitan isolasi melalui empat arus searah yang terukur saat pengujian. Tes respon osilasi digunakan untuk mengetahui perbedaan kualitas isolasi berdasarkan respon belitan terhadap gelombang osilasi dengan metode *Error Area Ratio* (EAR). Sedangkan pengukuran *LCR meters* digunakan untuk mendeteksi nilai induktansi, kapasitansi dan resistansi yang timbul akibat pengaruh kelembaban dan kontaminan didalam belitan stator. Selanjutnya nilai PI, respon osilasi dan pengukuran *LCR meters* dibandingkan, sehingga didapat grafik kecenderungan kerusakan. Berdasarkan hasil pengujian, metode EAR lebih cepat mendeteksi penurunan belitan isolasi sebesar 30,5% pada pengujian ke 2. Sementara itu nilai PI mampu mendeteksi pada pengujian ke 4. Sedangkan *LCR meters* tidak mendeteksi nilai induktansi, kapasitansi dan resistansi secara signifikan.

Kata Kunci : Percepatan Penuaan, Tahanan Isolasi, Kelembaban Tinggi, Efek Kontaminan, *Polarization Indeks* (PI) , Tes Respon Osilasi, Pengukuran *LCR meters*.

ANALYSIS OF INSULATION DETERIORATION DUE TO THE EFFECT OF HUMIDITY AND CONTAMINANTS IN LOADED INDUCTION MOTOR

Name : Dapis
NRP : 221320202
Advisor : Dr. Dimas Anton Asfani, ST, MT.
: Dr. Eng. I Made Yulistia N., ST, M.Sc

ABSTRACT

Induction motor damage is a serious problem in the industrialized world. One cause of the malfunction is a decrease in the quality of the insulation. Imposition constantly and environmental factors such as the influence of moisture and contaminants can affect a decrease in the quality of the insulation (deterioration). Although the insulation is designed able to withstand the pressure (stressed), but excessive pressure will accelerate the aging of insulation. This leads to decreased motor performance so that disrupt the production process and increase the maintainace cost. Therefore, the accelerated aging of the motor insulation should anticipated quickly and precisely. In this research, insulation deterioration is investigated in the loaded induction motor with high humidity and contaminants effect. The method used to evaluate the condition of the motor is the polarization index (PI), the test response oscillations (surge test) and LCR meters measurements. PI is used to determine the index values of polarization and isolation of prisoners winding through four direct current that is measured during testing. Oscillation response test used to determine differences in the quality of the winding insulation based on the response to the wave oscillation method error area ratio (EAR). While the measurement LCR meters are used to detect the value of inductance, capacitance and resistance arising from the influence of moisture and contaminants in the stator winding. Furthermore the value of PI, the response oscillation and measurement LCR meters are compared, in order to get the graph tendency damage. Based on test results, EAR faster method to detect a decrease of 30.5% winding insulation on testing to 2. Meanwhile, the value of PI is able to detect the test to 4. While the LCR meters did not detect the value of inductance, capacitance and resistance significantly.

Keywords : Acceleration Aging, Insulation Resistance, High Humidity, Effect Contaminants, Polarization Index (PI) and Test Response Oscillation.