

## ABSTRACT

MUHAMMAD REO

*Analisa Hasil Pengujian Transformator Satu Daya 20 MVA Gardu Induk  
Solok*

*Dibimbing oleh NOVI GUSTI PAHIYANTI, S.T., M.T*

Transformator daya merupakan peralatan utama dalam sistem penyaluran tenaga listrik yang berfungsi menyalurkan energi listrik melalui prinsip induksi elektromagnetik. Berdasarkan ketentuan IEC, umur rancang Transformator ditetapkan selama 20 tahun pada kondisi pembebanan penuh dan suhu lingkungan 20°C. Penelitian tugas akhir ini membahas analisis kelayakan transformator daya 1 20 MVA di Gardu Induk Solok yang telah beroperasi lebih dari 20 tahun. Evaluasi kelayakan dilakukan dengan mengacu pada hasil pengujian tahanan isolasi, indeks polarisasi (IP), tangen delta belitan dan bushing, rasio belitan, serta tegangan tembus minyak transformator (Breakdown Voltage/BDV). Hasil pengukuran dibandingkan dengan perhitungan teoritis dan standar IEEE, IEC, serta CIGRE untuk menentukan kondisi operasional transformator. Berdasarkan hasil evaluasi pengujian tahanan isolasi nilai ukur 5.2 Gohm standar minimum 1000 Mohm, untuk mengukur parameter nilai indeks polarisasi (10 menit/1 menit) hasil ukur PI yang didapat 1.86 untuk standarnya 1.25 dinyatakan masih bagus dioperasikan, sedangkan hasil ukur tangen delta dengan standar nilai pengujian lebih kecil dari 0.5% dan mendapat nilai ukur 0.3% masih bagus dioperasikan, dan begitupun rasio belitan standar nilai pengujian lebih kurang 0.5% mendapatkan nilai ukur 0.13%, dan untuk pengujian tegangan tembus minyak transformator standar minimum lebih kurang 50 kV dan hasil ukur yang didapat 80.1 kV, seluruh parameter pengujian masih berada dalam batas standar yang diizinkan sehingga transformator daya 1 20 MVA GI Solok dinyatakan masih layak dioperasikan meskipun telah melampaui umur rancangannya.

**Kata kunci** : Transformator Daya, Analisis Kelayakan, Gardu Induk Solok, Pengujian Isolasi, BDV.

## ABSTRACT

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### *Analysis of Test Results for a 20 MVA Single-Power Transformer at Solok Substation*

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Power transformers are the main equipment in the electricity transmission system, functioning to transmit electrical energy through the principle of electromagnetic induction. According to IEC regulations, the design life of a transformer is set at 20 years under full load conditions and an ambient temperature of 20°C. This final project research discusses the feasibility analysis of a 120 MVA power transformer at the Solok Substation, which has been operating for more than 20 years. Feasibility evaluation is carried out by referring to the results of insulation resistance tests, polarization index (PI), winding and bushing dissipation factor (tan delta), winding ratio, as well as transformer oil breakdown voltage (BDV). The measurement results are compared with theoretical calculations and IEEE, IEC, and CIGRE standards to determine the operational condition of the transformer. Based on the evaluation results of the insulation resistance test, the measured value was 5.2 Gohm, with a minimum standard of 1000 MOhm. To measure the polarization index parameter (10 minutes/1 minute), the measured PI value obtained was 1.86, with a standard of 1.25, indicating that it is still good to operate. Meanwhile, the measured tangent delta with a test standard value of less than 0.5% obtained a measured value of 0.3%, which is still good for operation. Similarly, the winding ratio test with a standard test value of approximately 0.5% obtained a measured value of 0.13%. For the transformer oil breakdown voltage test, the minimum standard is approximately 50 kV, and the measured value obtained was 80.1 kV. All test parameters remain within the allowed standard limits, so the 120 MVA power transformer at GI Solok is declared still suitable for operation, even though it has exceeded its design life. **Keywords:** Power Transformer, Feasibility Analysis, Solok Substation, Insulation Testing, BDV.