

ABSTRAK

ANALISIS *OVERLOAD* TRANSFORMATOR DISTRIBUSI PADA GARDU PD0681 DI PT. PLN (PERSERO) ULP AMPERA

(2026: xv + 53 Halaman + Daftar gambar + Daftar tabel + Lampiran)

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Transformator distribusi pada gardu PD0681 di PT. PLN (Persero) ULP Ampera mengalami kondisi beban lebih (*overload*) yang berpotensi mempercepat penuaan isolasi dan menurunkan keandalan sistem distribusi tenaga listrik. Penelitian ini bertujuan menganalisis tingkat pembebanan transformator saat beban puncak serta menentukan upaya penanggulangannya berdasarkan SPLN No. 50 Tahun 1997. Analisis dilakukan berdasarkan data pengukuran arus dan tegangan tiap fasa di lapangan secara langsung. Hasil perhitungan menunjukkan persentase pembebanan transformator mencapai 105,74% dari kapasitas nominal 100 kVA, sehingga dinyatakan *overload*. Sebagai solusi, dilakukan simulasi *uprating* kapasitas transformator menjadi 160 kVA, yang berhasil menurunkan tingkat pembebanan menjadi 66,09%, masuk dalam kategori aman sepenuhnya. Selain itu, proyeksi pertumbuhan beban menggunakan metode *Least Square* memperkirakan tingkat pembebanan pada tahun 2030 mencapai 76,11%, yang masih berada dalam batas aman operasi sesuai standar yang berlaku. Dengan demikian, *uprating* transformator dinilai sebagai solusi teknis yang tepat dan efektif untuk menjamin keandalan serta kontinuitas penyaluran tenaga listrik jangka panjang.

Kata Kunci: Transformator, Gardu Distribusi, Beban Lebih, Pergantian

ABSTRACT

ANALYSIS OF DISTRIBUTION TRANSFORMER OVERLOAD AT SUBSTATION PD0681 AT PT. PLN (PERSERO) ULP AMPERA

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The distribution transformer at the PD0681 substation at PT. PLN (Persero) ULP Ampera experienced an overload condition that has the potential to accelerate insulation aging and reduce the reliability of the electric power distribution system. This study aims to analyze the transformer loading level during peak loads and determine mitigation efforts based on SPLN No. 50 of 1997. The analysis was carried out based on direct field measurements of current and voltage for each phase. The calculation results showed that the transformer loading percentage reached 105.74% of the nominal capacity of 100 kVA, thus it was declared overloaded. As a solution, a simulation was carried out to uprate the transformer capacity to 160 kVA, which successfully reduced the loading level to 66.09%, entering the fully safe category. In addition, the load growth projection using the Least Square method estimates the loading level in 2030 to reach 76.11%, which is still within the safe operating limits according to applicable standards. Thus, transformer uprating is considered an appropriate and effective technical solution to ensure the reliability and continuity of long-term electricity distribution.

Keywords: Transformer, Distribution Substation, Overload, Switching