

ABSTRAK

ANALISIS PENGARUH BEBAN PUNCAK TERHADAP EFISIENSI TRANSFORMATOR DAYA 30 MVA Gardu Induk Sungai Juaro

(2026: xvii + 97 Halaman + 32 Daftar Gambar + 9 Daftar Tabel + 23 Lampiran)

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Penelitian ini bertujuan mengetahui rugi-rugi daya dan menganalisis pengaruh beban puncak terhadap efisiensi transformator daya 30 MVA di Gardu Induk Sungai Juaro serta kesesuaiannya terhadap standar yang berlaku. Data diambil selama tujuh hari pada periode beban puncak siang pukul 14.00 dan malam pukul 19.00 mengacu pada SPLN 61:1997. Hasil menunjukkan rugi inti konstan 20.000 W, rugi total siang 28.179,6 W — 43.619,6 W dan malam 30.048,9 W — 49.052,1 W. Beban puncak berpengaruh terhadap efisiensi melalui jarak daya semu aktual terhadap titik beban maksimum transformator sebesar 13,41 MVA, dimana rugi inti sama dengan rugi tembaga. $\cos \varphi$ turut berperan karena perubahannya menggeser nilai daya semu aktual terhadap titik tersebut. Efisiensi yang diperoleh berkisar 99,68% — 99,76% dan seluruhnya telah melampaui standar minimum SPLN 61:1997 sebesar 99,60%, sehingga transformator dinyatakan masih beroperasi dalam kondisi baik dan sesuai standar yang berlaku.

Kata Kunci: Transformator, Beban, Efisiensi, $\cos \varphi$, SPLN 61:1997

ABSTRACT
ANALYSIS OF THE EFFECT OF PEAK LOAD ON THE EFFICIENCY OF
THE 30 MVA POWER TRANSFORMER AT THE
SUNGAI JUARO SUBSTATION

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23 List of Appendices)

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This study aims to determine power losses and analyze the effect of peak loads on the efficiency of a 30 MVA power transformer at the Sungai Juaro Substation and its compliance with applicable standards. Data were collected for seven days during the peak load period at 14.00 and 19.00 referring to SPLN 61:1997. The results show a constant core loss of 20,000 W, total daytime losses of 28,179.6 W — 43,619.6 W and nighttime losses of 30,048.9 W — 49,052.1 W. Peak loads affect efficiency through the distance of the actual apparent power to the maximum load point of the transformer of 13.41 MVA, where core losses are equal to copper losses. $\cos \varphi$ plays a role because its changes shift the actual apparent power value to that point. The achieved efficiencies ranged from 99.68% to 99.76%, all exceeding the minimum standard of 99.60% in SPLN 61:1997. Therefore, the transformer is considered to be operating in good condition and in accordance with applicable standards.

Keywords: Transformer, Load, Efficiency, $\cos \varphi$, SPLN 61:1997