ABSTRAK

ANALISIS KONDISI OPERASI KUBIKEL 20 KV GH-T VIII PLAJU PADA WAKTU BEBAN PUNCAK DAN LUAR WAKTU BEBAN PUNCAK

(2026 : XV + 70 + Gambar + Daftar Pustaka + Lampiran)

M. YUSUF FAJRI
062330310516
JURUSAN TEKNIK ELEKTRO
PROGRAM STUDI DIII TEKNIK LISTRIK
POLITEKNIK NEGERI SRIWIJAYA

Kubikel 20 kV merupakan komponen vital dalam sistem distribusi tenaga listrik yang berfungsi sebagai perangkat switching, pengaman, dan penghubung antar penyulang pada gardu hubung. Penelitian ini bertujuan menganalisis kondisi operasi Kubikel 20 kV GH-T VIII Plaju pada dua kondisi, yaitu waktu beban puncak (WBP) dan luar waktu beban puncak (LWBP). Pengukuran dilakukan secara langsung pada kubikel untuk memperoleh data arus, tegangan, daya aktif (P), daya reaktif (Q), daya semu (S), dan faktor daya (cos φ). Hasil pengukuran menunjukkan bahwa arus tertinggi terjadi pada WBP sebesar 111 A dan terendah pada LWBP sebesar 85,8 A. Tegangan beroperasi stabil pada rentang 19,9–20,9 kV dan masih berada dalam batas toleransi ±5% dari tegangan nominal 20 kV. Daya aktif tertinggi tercatat 3.717 kW dan faktor daya konsisten di angka 0,96–0,97, melampaui standar minimal PLN sebesar 0,85. Persentase operasi tertinggi hanya mencapai 17,5% dari kapasitas nominal kubikel sesuai spesifikasi *nameplate*, sehingga Kubikel 20 kV GH-T VIII Plaju dikategorikan berada dalam kondisi Beban Rendah *(Underloaded)* dan masih memiliki kapasitas cadangan yang memadai untuk pertumbuhan beban di masa mendatang.

Kata kunci: Kubikel 20 kV, kondisi operasi, daya aktif, faktor daya, beban puncak.

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ABSTRACT
OPERATIONAL CONDITION ANALYSIS OF 20 KV CUBICLE GH-T VIII PLAJU DURING PEAK LOAD AND OFF-PEAK LOAD PERIODS

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M. YUSUF FAJRI
062330310516
DEPARTMENT OF ELECTRICAL ENGINEERING
DIPLOMA III STUDY PROGRAM IN ELECTRICAL ENGINEERING
POLITEKNIK NEGERI SRIWIJAYA

The 20 kV cubicle is a vital component in the electric power distribution system that functions as a switching device, protective equipment, and interconnection between feeders in a switching substation. This study aims to analyze the operational condition of the 20 kV Cubicle GH-T VIII Plaju under two conditions, namely the Peak Load Period (WBP) and the Off-Peak Load Period (LWBP). Measurements were conducted directly on the cubicle to obtain data on current, voltage, active power (P), reactive power (Q), apparent power (S), and power factor (cos φ). The measurement results indicate that the highest current occurred during the peak load period at 111 A and the lowest during the off-peak period at 85.8 A. Voltage operated stably within the range of 19.9–20.9 kV, remaining within the ±5% tolerance limit of the 20 kV nominal voltage. The highest active power was recorded at 3,717 kW and the power factor remained consistently at 0.96–0.97, exceeding PLN's minimum standard of 0.85. The highest operational percentage reached only 17.5% of the cubicle's nominal capacity based on its nameplate specifications, thus the 20 kV Cubicle GH-T VIII Plaju is categorized as being in an Underloaded condition and still possesses sufficient reserve capacity to accommodate future load growth.

Keywords: 20 kV cubicle, operational condition, active power, power factor, peak load.