

ABSTRACT

ANALYSIS OF VOLTAGE DROP DUE TO FULL LOAD ON THE BANDUNG VIP FEEDER USING ETAP SOFTWARE AT PT PLN (PERSERO) ULP BENGKALIS

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Voltage drop is one of the main issues in electrical distribution systems that may affect the quality and reliability of power delivery, particularly under full-load operating conditions. This study aims to analyze the magnitude of voltage drop, power losses, and delivery efficiency on the Bandung VIP Feeder at PT PLN (Persero) ULP Bengkalis using manual calculations and Load Flow simulation with the Electrical Transient Analyzer Program (ETAP). The analysis was conducted using network technical data consisting of an operating voltage of 20.58 kV, full-load current of 25 A, total conductor length of 18.4 km, and an Aluminum Conductor Composite Core (A3C) conductor with a cross-sectional area of 35 mm². The results show that the transmitted active power is 802.03 kW, with a total conductor resistance of 8.15 Ω , total reactance of 6.57 Ω , and a voltage drop of 441.66 V or 2.21% of the nominal voltage. In addition, total power losses are calculated at 15.28 kW, with technical energy losses of 1.91% and a power delivery efficiency of 98.09%. The ETAP simulation results show consistent trends and values with the manual calculations, verifying the validity of the analysis. Overall, the Bandung VIP Feeder operates within the allowable voltage drop limits and maintains good delivery efficiency.

Keywords: Electrical distribution system, voltage drop, power losses, load flow, ETAP, Bandung VIP Feeder.