ABSTRAK

EKO SUMEDI.

EFEKTIVITAS PROSEDUR PEKERJAAN DALAM KEADAAN BERTEGANGAN (PDKB) PADA PENGGANTIAN ISOLATOR POST AKIBAT TEGANGAN LEBIH PETIR DIJARINGAN 20KV PENYULANG RORO

Dibimbing oleh Sofitri Rahayu, S.Pd., M,Eng.

Penelitian ini bertujuan untuk menganalisis efektivitas prosedur Pekerjaan Dalam Keadaan Bertegangan (PDKB) pada penggantian isolator post akibat tegangan lebih petir di jaringan distribusi 20 kV Penyulang Roro. Penelitian dilakukan dengan pendekatan deskriptif kuantitatif berdasarkan data gangguan jaringan periode September–November 2025 serta data pengukuran tahanan isolasi sebelum dan sesudah penggantian isolator. Hasil pengujian menunjukkan bahwa nilai tahanan isolasi sebelum penggantian sebesar ±200 MΩ, yang mengindikasikan penurunan kemampuan isolasi akibat degradasi dan pengaruh surja petir. Setelah dilakukan penggantian menggunakan metode PDKB, nilai tahanan isolasi meningkat signifikan menjadi ±210 GΩ, menunjukkan perbaikan kondisi isolasi dan peningkatan keandalan jaringan. Dari sisi operasional, apabila pekerjaan dilakukan dengan metode offline (padam), durasi padam berkisar antara 1,4 hingga 3,8 jam, dengan nilai Energy Not Supplied (ENS) sebesar 625,0 kWh hingga 1.654,3 kWh per pekerjaan. Dengan penerapan metode PDKB, durasi padam sistem menjadi 0 jam sehingga ENS menjadi 0 kWh. Total energi yang berhasil ditekan dari seluruh pekerjaan mencapai 5.661,6 kWh. Hal ini menunjukkan bahwa metode PDKB efektif dalam menekan energi tidak tersalurkan, meningkatkan kontinuitas pelayanan, serta mendukung peningkatan keandalan jaringan distribusi 20 kV Penyulang Roro tanpa menimbulkan pemadaman tambahan selama proses pekerjaan.

Kata Kunci : PDKB, Isolator Post, Tegangan Lebih Petir, ENS, Keandalan Jaringan

ABSTRACT

EKO SUMANDI.

EFFECTIVENESS OF LIVE-LINE WORKING (PDKB) PROCEDURES IN POST INSULATOR REPLACEMENT DUE TO LIGHTNING OVERVOLTAGE ON THE 20 KV RORO DISTRIBUTION FEEDER

Supervised by Sofitri Rahayu, S.Pd., M,Eng

This study aims to analyze the effectiveness of the Live Line Working (PDKB) procedure in the replacement of post insulators damaged by lightning overvoltage in the 20 kV distribution network of Roro Feeder. The research employed a descriptive quantitative approach based on disturbance records from September to November 2025 and insulation resistance measurements conducted before and after insulator replacement. The measurement results indicate that the insulation resistance value prior to replacement was approximately ±200 MΩ, reflecting insulation degradation due to lightning surges and environmental exposure. After replacement using the PDKB method, the insulation resistance significantly increased to ±210 GΩ, demonstrating restoration of insulation performance and improved network reliability. From an operational perspective, if the work had been performed using the conventional offline (outage) method, the outage duration would range from 1.4 to 3.8 hours, resulting in Energy Not Supplied (ENS) values between 625.0 kWh and 1,654.3 kWh per activity. By implementing the PDKB method, system outage duration was reduced to 0 hours, and ENS became 0 kWh. The total ENS reduction achieved from all activities reached 5,661.6 kWh. These findings confirm that the PDKB method is effective in minimizing unsupplied energy, maintaining service continuity, and enhancing the reliability of the 20 kV Roro Feeder without causing additional outages during maintenance operations.

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Keywords: Live-Line Working (PDKB), Post Insulator, Lightning Overvoltage, Energy Not Supplied (ENS), Distribution Network Reliability.