

ABSTRAK

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ANALISA PERBAIKAN ISOLATOR TARIK PADA JARINGAN DISTRIBUSI MENGGUNAKAN METODE PDKB UNTUK MENINGKATKAN KEANDALAN SISTEM UP3 PEKANBARU

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Keandalan Sistem distribusi tenaga listrik merupakan salah satu indikator penting dalam menjaga mutu pelayanan kepada pelanggan. Salah satu penyebab menurunnya keandalan jaringan distribusi adalah kerusakan pada isolator tarik, yang berfungsi sebagai penyangga mekanis dan isolasi listrik antar konduktor. Kerusakan isolator tarik dapat menimbulkan gangguan seperti hubung singkat, putusnya konduktor, hingga padamnya aliran listrik yang berdampak pada meningkatnya nilai *Energy Not Supplied* (ENS) serta menurunnya indikator *System Average Interruption Frequency Index* (SAIFI) dan *System Average Interruption Duration Index* (SAIDI). Untuk mengatasi permasalahan tersebut, penelitian ini melakukan analisis perbaikan isolator tarik menggunakan metode Pekerjaan Dalam Keadaan Bertegangan (PDKB) pada jaringan tegangan menengah di wilayah kerja PLN Unit Pelaksana Pelayanan Pelanggan (UP3) Pekanbaru). Metode PDKB dipilih karena memungkinkan pelaksanaan pemeliharaan dan perbaikan jaringan tanpa perlu melakukan pemadaman, sehingga kontinuitas penyaluran energi listrik tetap terjaga. Penelitian ini menggunakan metode deskriptif dengan pendekatan studi lapangan dan analisis data gangguan sebelum serta sesudah pelaksanaan PDKB. Hasil penelitian menunjukkan bahwa penerapan metode PDKB pada perbaikan isolator tarik terbukti meningkatkan keandalan sistem distribusi dan ditunjukkan dengan penurunan nilai ENS. Selain itu, metode ini juga mendukung peningkatan efisiensi operasional dan memperkuat citra PLN sebagai penyedia layanan listrik yang andal dan responsif terhadap kebutuhan pelanggan. Berdasarkan hasil analisis data tahun 2025, diperoleh nilai SAIDI sebesar 2,951 jam/pelanggan/tahun dan SAIFI sebesar 0,052 kali/pelanggan/tahun. Nilai tersebut berada jauh di bawah standar keandalan yang ditetapkan dalam SPLN 59:1985, yaitu SAIDI $\leq 12,842$ jam/pelanggan/tahun dan SAIFI $\leq 2,415$ kali/pelanggan/tahun. Hal ini menunjukkan bahwa tingkat keandalan jaringan distribusi UP3 Pekanbaru tergolong andal dan penerapan metode PDKB berkontribusi dalam menekan durasi serta frekuensi pemadaman pelanggan. Selain itu, nilai ENS yang tercatat pada tahun 2025 sebesar 36.600,30 kWh, yang menunjukkan bahwa penerapan metode PDKB mampu menekan potensi energi yang tidak tersalurkan akibat gangguan pada isolator tarik.

Kata kunci: PDKB, Isolator tarik, Jaringan distribusi, Keandalan sistem, ENS (*Energy Not Supplied*)

ABSTRACT

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*ANALYSIS OF STRAIN INSULATOR REPAIR ON DISTRIBUTION NETWORKS
USING THE LIVE LINE WORKING (PDKB) METHOD TO IMPROVE SYSTEM
RELIABILITY AT UP3 PEKANBARU*

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The reliability of the electrical distribution system is one of the key indicators in maintaining the quality of electricity service to customers. One of the factors that can reduce the reliability of the distribution network is damage to the strain insulator, which functions as both a mechanical support and electrical insulation between conductors. Damage to the strain insulator may cause disturbances such as short circuits, broken conductors, and power outages, leading to an increase in the Energy Not Supplied (ENS) value and a decline in reliability indicators such as the System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI). To overcome these problems, this study analyzes the repair of strain insulators using the Working Forces Under Voltage (PDKB) method on medium-voltage distribution networks within the operational area of PLN Customer Service Implementation Unit (UP3) Pekanbaru. The PDKB method was chosen because it enables maintenance and repair work to be carried out without interrupting the power supply, thus maintaining the continuity of electricity distribution. This research uses a descriptive method with a field study approach and analysis of disturbance data before and after the implementation of PDKB. The results show that the application of the PDKB method in repairing strain insulators has proven to improve the reliability of the distribution system, as indicated by a reduction in the ENS value. In addition, this method supports improved operational efficiency and strengthens PLN's image as a reliable and responsive electricity service provider. Based on the results of the 2025 data analysis, the SAIDI value was 2,951 hours/customer/year and the SAIFI was 0.052 times/customer/year. These values are far below the reliability standards set in SPLN 59:1985, namely SAIDI \leq 12,842 hours/customer/year and SAIFI \leq 2,415 times/customer/year. This indicates that the reliability level of the UP3 Pekanbaru distribution network is classified as reliable and the application of the PDKB method contributes to reducing the duration and frequency of customer outages. In addition, the ENS value recorded in 2025 was 36,600.30 kWh, which indicates that the application of the PDKB method is able to reduce the potential for undelivered energy due to disturbances in the tensile isolator.

Keywords: *Working Forces Under Voltage (PDKB), strain insulator, distribution network, system reliability, ENS (Energy Not Supplied)*