ABSTRAK

ANDRY ACHMAD HIDAYAT
PERANCANGAN DAN EVALUASI SISTEM PENCEGAHAN GANGGUAN HEWAN TERHADAP TRANSFORMATOR DAYA OPEN TYPE 150 KV UNTUK PENINGKATAN KEANDALAN SISTEM TRANSMISI
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Transformator daya merupakan peralatan utama pada gardu induk yang berfungsi untuk menyalurkan dan mentransformasikan energi listrik antar level tegangan. Keandalan operasi transformator sangat berpengaruh terhadap kontinuitas penyaluran tenaga listrik kepada pelanggan. Salah satu jenis gangguan yang sering terjadi, khususnya pada transformator daya dengan desain busbar tegangan rendah terbuka (*open type*), adalah gangguan system fault yang disebabkan oleh aktivitas binatang. Gangguan tersebut berpotensi menimbulkan pemadaman beban (*load outage*), meningkatkan nilai *Energy Not Supplied* (ENS), serta menurunkan kinerja keandalan sistem transmisi. Untuk meminimalkan gangguan akibat aktivitas binatang dan meningkatkan keandalan sistem transmisi, diperlukan suatu alat pencegah binatang yang efektif, tahan lama, serta tidak mengganggu aktivitas operasi dan pemeliharaan transformator. Penelitian ini bertujuan untuk merancang, mengimplementasikan, dan mengevaluasi kinerja *Anti Climbing Animal Device* (ACAD) sebagai alat pencegah binatang pada transformator daya. ACAD dirancang untuk dipasang pada kabel power 20 kV dan struktur penyangga (support) kabel, dengan menggunakan material plastik berduri sebagai penghalang pada kabel dan besi galvanis pada support kabel. Implementasi ACAD dilakukan pada Trafo #3 Gardu Induk 150 kV Ancol yang memiliki riwayat gangguan akibat aktivitas binatang. Evaluasi dilakukan dengan membandingkan kondisi sebelum dan sesudah pemasangan ACAD berdasarkan data gangguan, keandalan operasional, serta observasi lapangan. Hasil penelitian menunjukkan bahwa pemasangan ACAD efektif dalam mencegah akses binatang ke area kritis transformator, sehingga mampu menurunkan potensi terjadinya gangguan system fault. Selain memberikan manfaat teknis berupa peningkatan keandalan transformator, penerapan ACAD juga berkontribusi dalam mengurangi potensi kerugian finansial akibat pemadaman serta meningkatkan kinerja unit operasional. Dengan demikian, ACAD dapat direkomendasikan sebagai solusi preventif yang aplikatif dan berkelanjutan untuk pencegahan gangguan binatang pada transformator daya tipe open type.

Kata kunci: Transformator Daya, *System Fault, Anti Climbing Animal Device* (ACAD)

ABSTRACT

ANDRY ACHMAD HIDAYAT
DESIGN AND EVALUATION OF ANIMAL DISTURBANCE PREVENTION SYSTEM FOR 150 KV OPEN TYPE POWER TRANSFORMER TO IMPROVE TRANSMISSION SYSTEM RELIABILITY
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Power transformers are critical components in substations that function to transmit and transform electrical energy between voltage levels. The operational reliability of power transformers has a significant impact on the continuity of electricity supply to customers. One type of disturbance frequently encountered, particularly in power transformers with an open-type low-voltage (LV) busbar design, is a system fault caused by animal activity. Such disturbances can lead to load outages, increase Energy Not Supplied (ENS), and degrade the reliability performance of the transmission system. To minimize disturbances caused by animal activity and to improve transmission system reliability, an animal deterrent device that is effective, durable, and does not interfere with transformer operation and maintenance is required. This study aims to design, implement, and evaluate the performance of an Anti Climbing Animal Device (ACAD) as an animal deterrent for power transformers. ACAD is designed to be installed on 20 kV power cables and their supporting structures, utilizing spiked plastic material as a barrier on the cables and galvanized steel on the cable supports. The implementation of ACAD was carried out on Transformer #3 at the 150 kV Ancol Substation, which has a history of disturbances caused by animal activity. The evaluation was conducted by comparing conditions before and after ACAD installation based on disturbance records, operational reliability indicators, and field observations. The results indicate that the installation of ACAD is effective in preventing animal access to critical areas of the power transformer, thereby reducing the potential occurrence of system faults. In addition to providing technical benefits in terms of improved transformer reliability, the implementation of ACAD also contributes to reducing potential financial losses due to power outages and enhancing the performance of the operational unit. Therefore, ACAD can be recommended as a practical and sustainable preventive solution for mitigating animal-related disturbances in open-type power transformers.

Keywords: Power Transformer, System Fault, Anti Climbing Animal Device (ACAD)