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UMSIDA
DARI SINI PENCERAHAN BERSEMI

Pengaruh Proses Purifikasi Oli terhadap Nilai Breakdown Voltage (BDV) dan Water Content pada Transformator Daya 3 Fasa

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Pendahuluan

Latar Belakang

- Transformator daya memerlukan minyak isolasi sebagai media pendingin sekaligus isolator listrik.
- Penurunan kualitas minyak menyebabkan penurunan kemampuan isolasi transformator.
- Kandungan air (water content) yang tinggi mengakibatkan penurunan nilai Breakdown Voltage (BDV).
- Oil purification merupakan metode pemeliharaan untuk menghilangkan air, gas, dan partikel kontaminan sehingga kualitas minyak dapat dipulihkan.
- Penelitian dilakukan untuk mengetahui efektivitas proses purifikasi terhadap peningkatan kualitas minyak transformator.

Pertanyaan Penelitian (Rumusan Masalah)

1. Bagaimana pengaruh proses oil purification terhadap nilai Breakdown Voltage (BDV) minyak transformator?
2. Bagaimana pengaruh proses oil purification terhadap kandungan air (water content)?
3. Bagaimana hubungan antara water content dan nilai BDV setelah dilakukan proses purifikasi?

Metode

Jenis Penelitian

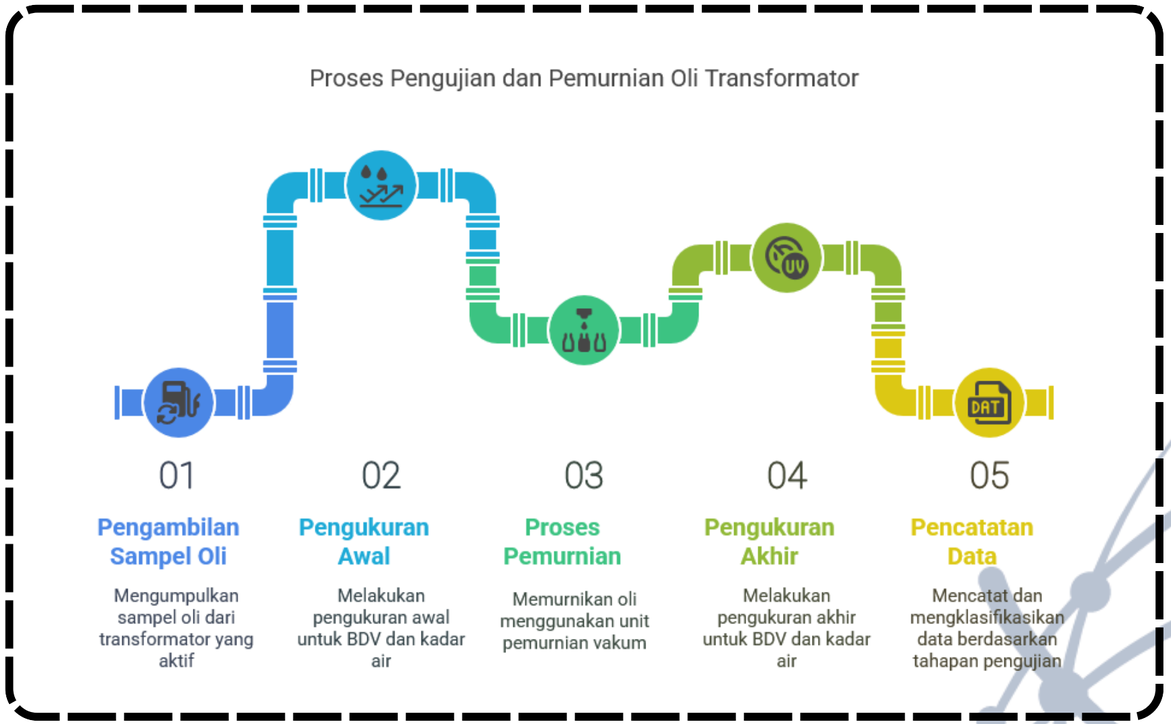
- Penelitian kuantitatif
- Metode eksperimen

Tahapan Penelitian

- Pengambilan sampel minyak
- Pengujian awal BDV
- Pengujian awal Water Content
- Proses Oil Purification
- Pengujian akhir BDV
- Pengujian akhir Water Content
- Analisis statistik (Paired Sample t-Test, Korelasi Pearson, dan Regresi Linear)

Sampel

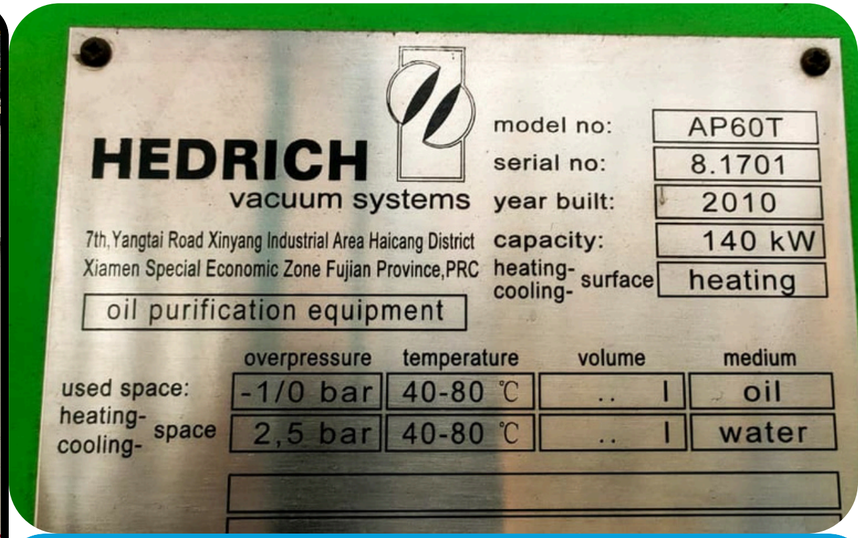
- Penelitian kuantitatif
- Metode eksperimen

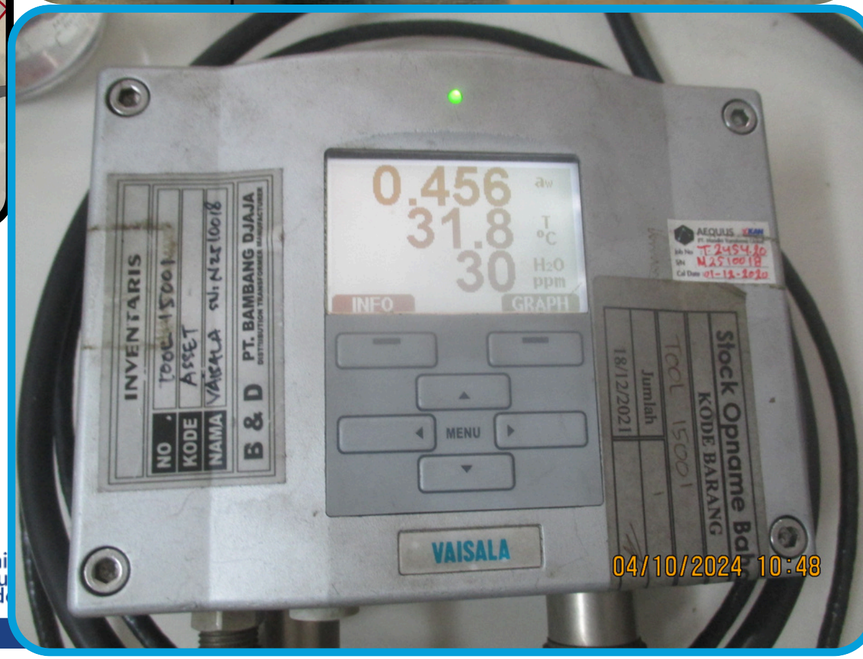


Metode

Instrumen

- Megger OTS80PB (IEC 60156)
- Vaisala (IEC 60814 dan ASTM D1533)
- Mesin Hedrich Vacuum System AP60T

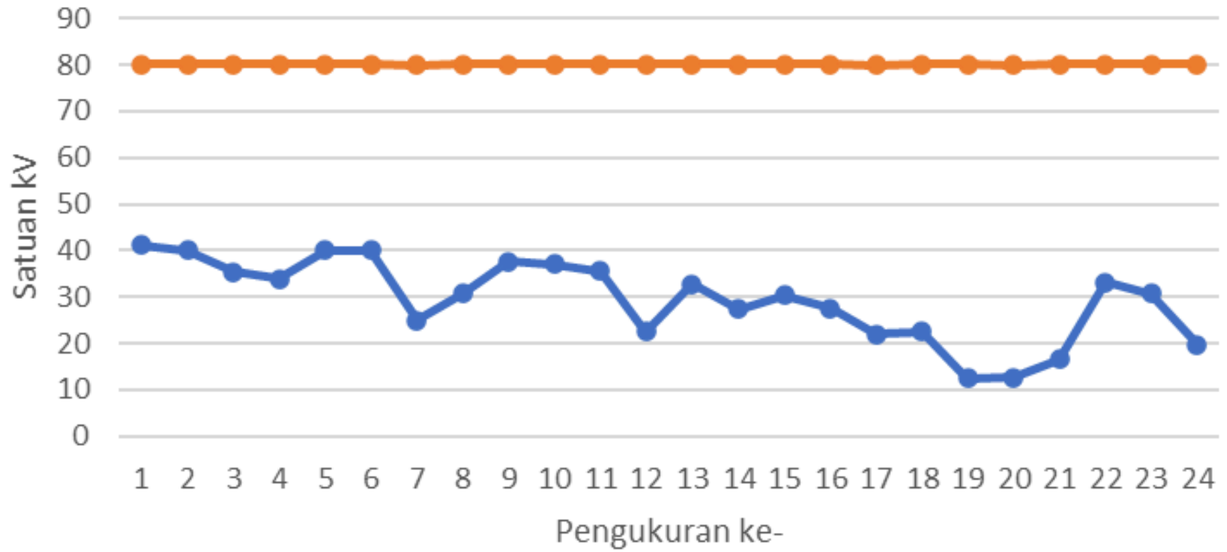




Hasil

HASIL PENGUJIAN BDV

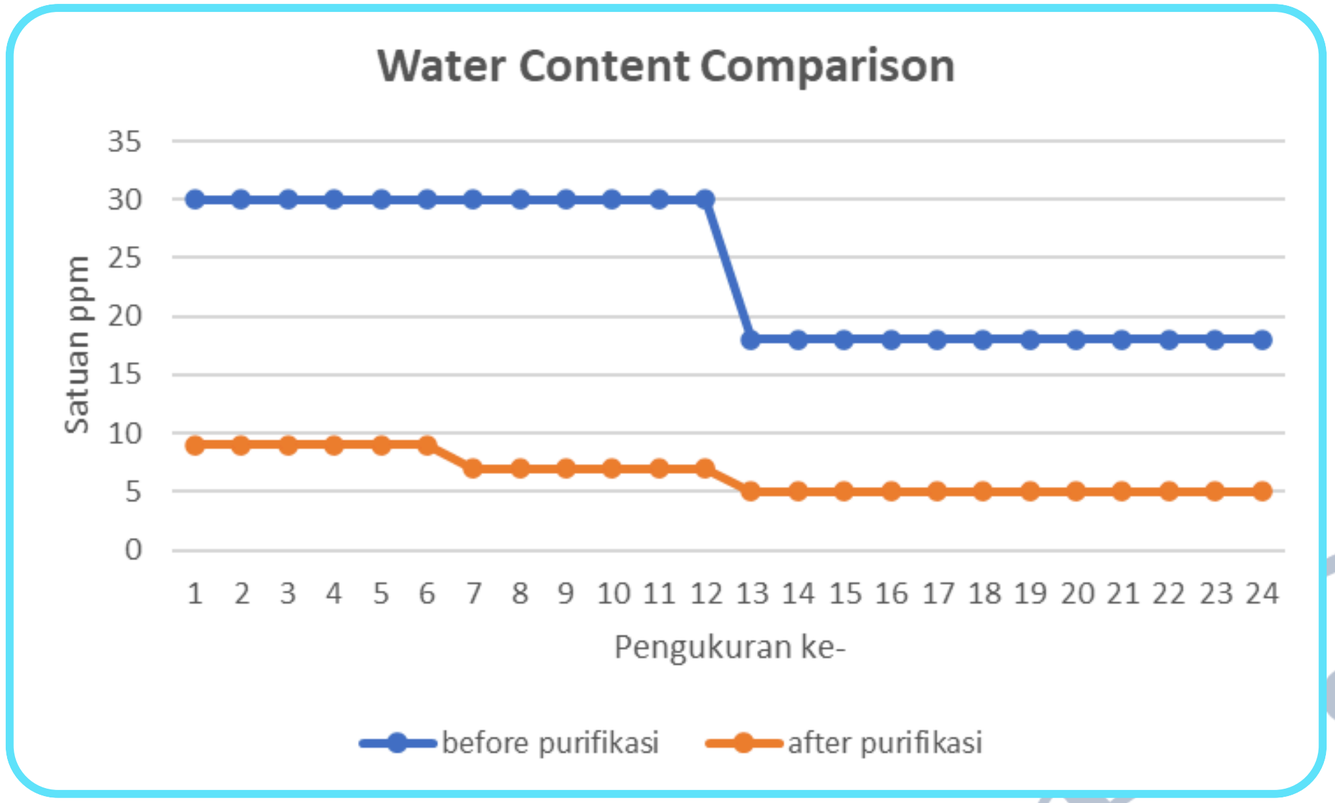
- **Rata-rata BDV**
- **Sebelum purifikasi: 29,45 kV**
- **Sesudah purifikasi: 80,12 kV**
- **Kesimpulan**
- **Terjadi peningkatan signifikan nilai BDV.**



Hasil

HASIL PENGUJIAN WATER CONTENT

- **Rata-rata Water Content**
- **Sebelum purifikasi: 24 ppm**
- **Sesudah purifikasi: 6,5 ppm**
- **Kesimpulan**
- **Terjadi penurunan signifikan kadar air.**



Pembahasan

PEMBAHASAN

- **Oil purification efektif meningkatkan kualitas minyak transformator.**
- **Penurunan kadar air meningkatkan kekuatan dielektrik.**
- **Hasil sesuai teori dielektrik dan penelitian terdahulu.**
- **Water content merupakan faktor dominan terhadap nilai BDV.**

Temuan Penting Penelitian

TEMUAN PENTING PENELITIAN

- **Oil purification secara signifikan meningkatkan nilai Breakdown Voltage.**
- **Oil purification secara signifikan menurunkan kadar air dalam minyak transformator.**
- **Rata-rata BDV meningkat dari 29,45 kV menjadi 80,12 kV.**
- **Water content menurun dari 24 ppm menjadi 6,5 ppm.**
- **Metode oil purification efektif digunakan sebagai bagian dari condition-based maintenance transformator daya.**

Manfaat Penelitian

MANFAAT TEORITIS

- **Menambah referensi mengenai pengaruh proses purifikasi terhadap kualitas minyak transformator.**

MANFAAT PRAKTIS

- **Menjadi acuan dalam pemeliharaan transformator berbasis kondisi (condition-based maintenance).**
- **Membantu meningkatkan keandalan sistem tenaga listrik.**
- **Mengurangi risiko kegagalan isolasi transformator akibat degradasi minyak.**

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