

## ABSTRAK

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**Judul** : Uji Korelasi Pengaruh Pembebanan Dan Suhu Terhadap Susut Umur Transformator Daya 150/20 KV Di Gardu Induk Balaraja Lama  
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Transformator berfungsi sebagai penyaluran tenaga listrik. Transformator memiliki umur desain yang telah ditentukan oleh perusahaan manufaktur sehingga dapat beroperasi dalam kurun waktu tertentu. Namun dengan pengoperasiannya di lapangan, susut umur transformator dapat terjadi karena beberapa faktor, diantaranya yaitu pembebanan dan suhu lingkungan yang dapat mempengaruhi suhu transformator. Pembebanan mengakibatkan panas pada kumparan dan oli transformator yang dapat meningkatkan suhu transformator sehingga dapat menyebabkan penurunan kemampuan isolasi belitan yang akhirnya berakibat pada pengurangan umur transformator. Suhu lingkungan merupakan faktor penting dalam penentuan suhu *hotspot*, karena berhubungan langsung terhadap perubahan suhu pada transformator. Pada penelitian ini dilakukan analisis untuk mengetahui uji korelasi pengaruh pembebanan dan suhu transformator terhadap susut umur transformator daya 150/20 KV di Gardu Induk Balaraja lama selama 1 bulan operasi di bulan januari 2022. Berdasarkan hasil analisis didapatkan bahwa korelasi antara pembebanan dengan kenaikan suhu stabil *top oil* sebesar 0.991 sehingga dapat diartikan hubungan tersebut sangat kuat. Diperoleh juga bahwa korelasi antara suhu *hotspot* dengan laju penuaan termal relatif sebesar 0.983 yang dapat diartikan hubungan tersebut sangat kuat. Susut umur yang transformator unit 3 Gardu Induk Balaraja Lama pada 1 bulan operasi diperoleh 0,00277 dengan itu berdasarkan standar IEC 60076-7 didapat bahwa perkiraan sisa umur transformator yakni 17,24 tahun.

**Kata kunci** : Transformator, pembebanan, suhu *hotspot*, suhu *top oil*, susut umur,

## ABSTRACT

*The transformer functions as a distribution of electric power. The transformer has a design life that has been determined by the manufacturing company so that it can operate within a certain period of time. However, with the operation in the field, the transformer life shrinkage can occur due to several factors, including loading and ambient temperature which can affect the transformer temperature. Loading causes heat in the coils and transformer oil which can increase the temperature of the transformer so that it can cause a decrease in the insulating ability of the windings which ultimately results in a reduction in the life of the transformer. Ambient temperature is an important factor in determining the hotspot temperature, because it is directly related to temperature changes in the transformer. In this study, an analysis was carried out to determine the correlation test of the effect of loading and transformer temperature on the life loss of 150/20 KV power transformers at the old Balaraja Substation for 1 month of operation in January 2022. Based on the results of the analysis, it was found that the correlation between loading and the increase in stable top oil temperature was 0.991, so it could be interpreted that the relationship was very strong. It was also found that the correlation between the hotspot temperature and the relative thermal aging rate was 0.983, which means that the relationship is very strong. The loss of life of the transformer unit 3 in*

*the Balaraja Lama Substation in 1 month of operation was obtained 0.00277 with that based on the IEC 60076-7 standard it was found that the estimated remaining life of the transformer was 17.24 years.*

**Keywords :** *Transformer, loading, hotspot temperature, top oil temperature, loss of life.*