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ALGORITHM AND DEVELOPMENT OF A PROGRAM FOR CALCULATION OF LIFE DURATION OF OIL IMMERSED TRANSFORMERS

ABSTRACT

Due to daily and seasonal changes in the consumption of electric power in the electric power system, the changes in ambient temperature and also due to changes in the network, it is necessary to have the transformers loaded with power bigger than the rated one. In order to reduce the costs for transmission and distribution of electric power, the overloading of transformers should be controlled. This master's thesis describes the way to use the international standard IEC 354 which deals with this mater, because the experience has shown this to be necessary in the engineering practice. Based on the algorithm presented in this standard, a computer program for calculation of transformer ageing at a given daily and yearly load profile is developed. Also, by use of this program can be obtained the maximum values of winding hot-spot temperature and top oil temperature at a given load diagram. It will help to determine if the given load diagram can be applied to the transformer under consideration. This will allow to plan the loading of a given transformer on one side and to dimension transformer substations on other side, thus contributing to significant power, i.e. investment savings. This program has been applied to a transformer of 50 kVA, 10/0.4 kV, for a predetermined load diagram using the actual measured thermal characteristics and typical thermal characteristics.

Keywords: life duration, oil immersed transformer, hot-spot, temperature model, overloading, load diagram, thermal characteristics.