F.5. Accélération des arborescences d'eau en fonction du gradient de température

RYNKOWSKI A.W., TU of Gdansk, Pologne

F.5. Water treeing acceleration vs right temperature gradient

RYNKOWSKI A.W., TU of Gdansk, Poland

The field experience has shown that the life of polyethylene medium voltage cables is sometimes much shorter than expected. It is known that the worst situation occurs when the cables are working in a wet environment. Still there is a need for , provable in service, water treeing phenomena model as well as for conditions which really accelerate water treeing in a thick cable insulation at 1-3 kV/mm AC stresses.

The water treeing phenomena model elaborated by the author (to be published) says that a gradient of temperature is one of the factors accelerating water treeing . An instric influence of the temperature gradient depends on insulation properties being the function of temperature.

In the previous tests it was established by the author that the water trees grow much faster when the test temperature across the insulation was close to 2-3 ^C . The question put down for the new pilot tests was to establish the range of the ambient temperatures in which an acceleration of water tree growths is the fastest one while the heating temperature is kept constant.

In the paper results of preliminary tests on influence of gradient of temperature on growth of vented tress in polyethylene insulation are presented. The tests were conducted on 3mm thick polyethylene samples. Three groups of samples were aged at 3.3 kV/mm AC stress for 1650 hours. The heating temperature for all the samples was kept the same and equal to 70 ^C. There were three ambient temperatures for the sample groups . The pictures of aged insulation and average vented tree lengths were used for analysis.

It has been proved that the gradient of temperature accelerates water tree growth very much . The growth is the fastest one when the ambient temperature is lower than 20 ^ C. The uniform vented trees sometimes reached 80 % of 3mm insulation aged at the test conditions . The results of pilot tests presented in the paper are the part of a large programme conducted by the author and directed to prove validation of the model and to elaborate a new acceleration method of estimation materials and power cables against water treeing.