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INSULATION COORDINATION OF POWER CABLES WITH SOLID DIELECTRIC

ABSTRACT

Cables as the elements of transmission and distribution systems have great influence on reliable service and overall planning requirements. This paper intends to clarify and propose a concept approach to the design of the insulation system of power cables with solid dielectric insulation, for use in transmission and distribution systems in possible service conditions. Also, this paper presents the results of an investigation into changing of cross-linked polyethylene (XLPE) cable insulation breakdown stress (AC BDS) as a function of temperature and aging time. The paper deals with AC BDS of the following kinds of XLPE cable insulation: steam and dry cured with water tree retardant cross-linked polyethylene (TR-XLPE) and non-tree retardant cross-linked polyethylene (XLPE). During the tests, the tap water was injected: (1) into the conductor with cable ends closed and (2) into the cable conductor with ends opened. The presence of water in XLPE cables was subjected to electrical stress and heating. AC BDS tests were performed as a function of aging time and water content in the cable insulation at different aging temperatures. In this investigation, tests with the changing of AC BDS in the radial direction of unaged and aged XLPE cable insulation were carried out. Finally, this paper discusses the influence of water on dielectric strength, and in this way its influence on insulation coordination.

Keywords: insulation coordination, solid dielectric, aging of XLPE cable insulation, water absorption, breakdown stress.