B.3.1. The effect of preconditioning on the performance of MV-XLPE cables in long term water treeing tests

This paper presents results obtained in long term wet ageing tests performed on 12 kV XLPE cables. The test duration was three years. The main purpose is to study the effect of different preconditioning procedures used prior to the long term ageing. No preconditioning, dry preconditioning in an air ventilated oven and wet preconditioning in heated tap water is evaluated. Tests according to ten different ageing conditions are presented.

The paper demonstrates that the preconditioning has an effect upon the cable properties. The initial breakdown voltage levels were reduced by a factor of 25 to 40%. After two years of ageing these differences in voltage levels had disappeared. Also bow-tie tree- and vented water tree growth were influenced by the three different preconditioning procedures. The observed differences in water tree growth do, however, not appear as significant differences in the breakdown voltage levels after ageing.

Abstract

In principle the methods can be categorized in three groups:
1) No preconditioning before ageing.
2) Drying and degassing the cables in an air ventilated oven at an elevated temperature.
3) Preconditioning the cables in water at an elevated temperature.

The objective of this investigation is to compare different preconditioning methods. The long term effect on the XLPE cables are evaluated on the premises that prior to the ageing the cables are exposed to three different preconditioning procedures.

2. Test objects

This work has been performed on cables produced in 1990. Cables from two manufacturers have been evaluated. Some of the cable features are shown in Table 1.

<table>
<thead>
<tr>
<th>Cable</th>
<th>Manufacturer</th>
<th>Insulation Screen</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>A</td>
<td>Strippable</td>
<td></td>
</tr>
<tr>
<td>Y1</td>
<td>B</td>
<td>Strippable</td>
<td></td>
</tr>
<tr>
<td>Y2</td>
<td>B</td>
<td>Strippable</td>
<td>Other production</td>
</tr>
</tbody>
</table>

The IEC denomination of the cables is 6/10 (12) kV; nominal insulation thickness is 3.4 mm.

Before the ageing tests were started all external coverings of the cables were removed; PE-sheath, copper screens, etc. If the cables were preconditioned this removal was performed before the preconditioning.