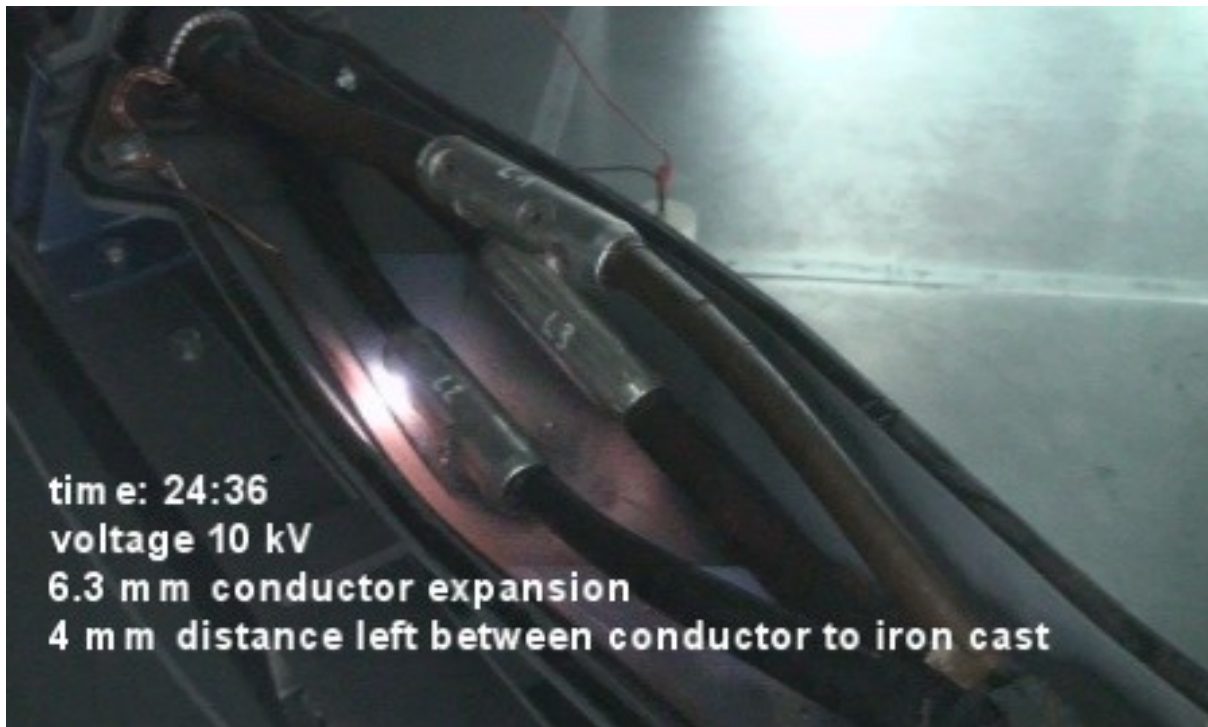


The Thermo Mechanical Behavior of Joints in MV Cable Systems Exposed to High Current Loads



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ABSTRACT

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High (cycling) current loads in medium voltage cable networks will become more and more common for economical reasons and because of wind mill parks and other sources of power generation or demand.

Dutch network owners are experiencing a higher rate of outages in the medium voltage networks which are directly related to these higher (cycling) current loads in their grids. These outages mainly come from failing joints. This prompted the Dutch network owners to search for the causes of breakdown and their remedies, in cooperation with KEMA and the Dutch manufacturer of cable joints, Lovink.

The questions to be answered are:

- 1 How sensitive are the various types of joints existing already for a long time in the networks?
- 2 How sensitive are the new types of joints that are being applied in recent years and which will be used in future years as well?
- 3 In case also new types of joints suffer from these high (cycling) loads, why did type tests carried out in the past not find their susceptibility for high current (cycling) loads?
- 4 And in case even present type tests do not sufficiently represent high current (cycling) loads, what could be a possible recommendation for an update of these tests?

So far, a study is made of the first two items.

ABSTRACT

In the paper, in the first place a summary will be given of the possible degradation mechanisms that can be foreseen under high load (cycling) conditions, with a focus on the mechanical performance of joints. The paper will also show the theoretical mechanical forces that might be the result of high loads. Especially the forces that come with the expansion of a conductor will be shown to be considerable.

After these desk study related matters, the focus will go to some laboratory tests that show that indeed certain types of joints are quite susceptible for the above mentioned forces and moreover that these forces are close to those foreseen from a theoretical point of view.

The laboratory tests so far have been carried out on joints for PILC cables as mastic filled joints and oil-filled joints. Apart from that, attention is given to conductor connectors that have been and are being applied in all types of joints for all types of cables. The paper will show in what way such joints (or joint parts) are indeed susceptible for the expanding and contracting forces that come with load and load cycling.