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Investigation of European specification for medium voltage power cables

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Synthetic cables used in Europe have now good experience feedback, but designs are very different in Europe.

Due to technical improvements in insulation materials achieved during the last 20 years, utilities and the manufacturers have considered that optimisation of medium voltage cables was possible. In addition they were of the opinion that standardisation of all these designs should be attempted.

Hence, in the framework of an European project consortium, utilities and manufacturers have undertaken work to rationalise the design of medium voltage distribution cables both in terms of cost reduction and European harmonisation.

During this project, Electricity Utilities and Cable Manufacturers will together investigate ways of optimising cables. These investigations will focus on the reduction of insulation and oversheath and possible change of materials.

At the end of the project, a specification proposal for new medium voltage cable designs will be produced on a consensus basis within the project consortium. This specification proposal will be submitted to the standardisation Working Group 09 of CENELEC TC20 with a view to its introduction into HD620.

This paper presents progress of the work carried out since the beginning of the project.

The first part of this project, related to present practice in European countries, has been achieved and comprises the following steps:

- Comparison of cable test requirements: the group has collated data from European countries, identified similarities and differences, analysed their background, and provided a proposal for rationalisation for each item, for discussion. The group then produced an agreed document.
- Comparison of cable specifications requirements: same approach as above
- Comparison of distribution system requirements: same approach as above
- The results of the 3 previous steps, supported by a functional analysis of cables and systems, were reviewed and led to a first draft outline specification for the cable.

The second part of the project, relates to studies, and is presently in progress, comprising the following steps:

- Cable designs (and accessories): 4 designs were proposed, in order to cover the whole European market:
 - insulation: 3 cables with XLPE ($\sigma_{\max} \sim 3.8$ kV/mm), 1 cable with HEPR ($\sigma_{\max} \sim 4,3$ kV/mm)
 - conductor: 3 cables having class 2 conductors, 1 cable having a class 1 conductor
 - screen: copper wires, bonded aluminium foils sheath, and combination of both
- Manufacture of these cables is now complete.
- Tests have just started and are more oriented towards a research approach rather than standardisation. Hence, the tests that have been retained for the investigations, are chosen to prove a technical assessment and to give confidence in the new designs. They include long term tests in water, impact and abrasion tests, thermomechanical tests, a sidewall pressure test, bending and hot impulse tests.