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New solution for a medium voltage link

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A realistic technical and economical approach of a medium voltage distribution link shall consider all the life cycle of the link, and all its components (cables, joints, terminations, ...). In this paper, the global cost of a link shall be decomposed in:

- an initial investment including the engineering, the purchase of components (cables and accessories), their transportation and storage, the civil works, the cable laying and connecting
- a service cost including the maintenance and the loss during the link lifetime
- an end-of-life cost including the removing and the recycling.

The cables, the technique of laying and jointing are key elements of the link, and their design shall be based on a global approach of the system.

The purpose of this paper is to present innovating solutions in the case of the French underground medium voltage distribution network. These solutions are based on new components:

- a new mechanically reinforced medium voltage which is directly buriable without any additional protection in the trench
- and a new cold-shrinkable joint associated with mechanical connectors and a special mechanical protection to joint two lengths of directly buriable cable

The above recently developed cable can be buried directly in any type of ground and without a sand bedding nor controlled backfilling. It allows a drastic reduction of the initial cost of the link. The innovating outer protection of the cable offers several advantages:

- a consequent mechanical reinforcement against abrasion and impacts is provided
- flexibility of the cable is maintained
- the installation proceedings of the connecting accessories are unchanged
- the cable capacity is not significantly reduced.

So, the economic gain due to the suppression of the sand is not balanced by increasing costs during phases of cable handling, preparation and splicing. Moreover, this cost reduction of the initial invest is obtained without increasing the service cost because the transmission capacity is preserved. Tests performed in laboratory and in the field ensure the reliability in service of the cable, even in harsh environments. The detailed cost impact on the link and test results will be presented in this article.

The new cold-shrinkable joint provides an optimisation of the connecting time. Its design has been prepared in order to facilitate the life of the fitter:

- Multi-section mechanical connectors are integrated in the packing. So, with one cold-shrinkable joint kit, one can connect indiscriminately cables with conductor cross-section from 95 mm^2 to 240 mm^2. And there is no need of heavy tool kits such as an hydraulic press as for compression connectors.
- All the function of the joint (insulation, shielding and outer protection) are integrated in one multi-layer element delivered expanded on removable tubular supports and ready to be applied.
- The multi-layer joint is easily, effortlessly and fast shrinkable.
- The removable tubular supports can be reused as mechanically reinforced external protection in case of direct burying.

The detailed cost impact on the link and tests results will be discussed in this article.