Compact paperless joint for transition from LPFF to XLPE cables

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Network of underground low pressure fluid filled (LPFF) cables is under continuous transformation towards a full solid insulation cables, typically XLPE. There are multiple drivers of such transformation, e.g. aged cables, damage from third parties without spare cable of the same design, ampacity upgrade and many others. For such reason, replacement of LPFF cables may have place mainly in two different ways: either the whole circuit is replaced or only one or few spans of LPFF cables are replaced with XLPE cables with same or larger cross-section.

Last approach requires the use of so-called transition joints. Such joints looks typically almost like a back-to-back termination, are quite massive, long and requires jointing skills on both technology paper and XLPE and it is a matter of fact that such skills, for LPFF cables, are less and less easily available on the market.

This paper reports about the concept, the design, FEM simulation and development test of a new compact paperless transition joint.

Such solution has several advantages, the main being the fact that no specific skill for LPFF cables is required: no more hand paper lapping or pencil profiling is required. Such features dramatically reduce time of installation when compared to standard transition joints. The joint is extremely compact and comparable in size with a standard joint for XLPE cables. Such characteristic is extremely important mainly when has to be installed in an urban environment where space constrains for joint bay are extremely demanding. In addition such joint can be factory tested, therefore for quality of installation and reliability of the solution is comparable with joints for XLPE cables.

Keywords: Transition joint, paperless, LPFF cables, XLPE cables