A.7.1.
Subsea XLPE cables
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Abstract: Subsea cable links are increasingly being installed as effective ways to solve many electricity supply issues. In common with terrestrial cables, XLPE is routinely chosen as the insulation technology. Although Subsea XLPE cables are electrically very similar to terrestrial cables the subsea environment adds the challenges of very long lengths, low redundancy and an aggressive environment. Thus to deal with these issues an advanced insulation technology is required.

This paper discusses a number of these challenges for both distribution and transmission voltages. The requirements for longevity of medium voltage cables in wet conditions and the increased performance needs are discussed. The "dry" design of transmission cables safeguards the electrical performance. However to enable these cables to be produced with high efficiency requires that the insulations have special attributes.

Keywords: XLPE, Subsea, MV, HV

1. Introduction
XLPE is the insulation of choice for modern HV (36 - 161kV) and EHV (>161kV) land cable systems. Since its introduction for commercial HV cable systems in the early 1970s XLPE has been used in ever more challenging circumstances. A growing and challenging application area is that of subsea cables.

In today’s subsea cable environment we find:
- Very long length HV XLPE cable systems being used in major subsea projects [1-3]
- Novel integrated solutions for direct electrical heating of oil flowlines to improve productivity of seabed oil exploration [4]
- Subsea HVDC extruded cables - Cross Sound 150kV 30km [5]
- The use of XLPE for subsea cables, for both dry and wet designs, is increasing rapidly with the increasing need for interconnections and power transfer offshore

Within this rapidly evolving area a number of challenges exist. Perhaps chief among them is the different nature of subsea and terrestrial links in terms of system redundancy. Subsea links tend to have little redundancy; consequently any fault, most usually from third party damage, will remove the link from service. Thus reliability and protection are the most important considerations.