



A.7.1.

Subsea XLPE cables

HAMPTON R.N., RYDIN C., SMEDBERG A. , Borealis AB, Sweden

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]

Résumé: Les liaisons par câbles sous-marins s'imposent de plus en plus comme des solutions efficaces pour résoudre les nombreux problèmes d'alimentation électrique. Comme pour les câbles terrestres, la technologie d'isolation la plus courante est le PRC. En dépit de grandes similarités avec les câbles terrestres, la mise en œuvre de ces câbles PRC dans l'environnement sous-marin pose des problèmes supplémentaires dus aux très longues distances, au faible taux de redondance et à un environnement hostile. Pour s'affranchir de ces problèmes, le recours à une technologie d'isolation évoluée s'avère indispensable.

Le présent article aborde plusieurs de ces problèmes aussi bien sous l'angle des câbles de distribution que de transmission. Il passe en revue les exigences de longévité applicables aux câbles moyenne tension en présence d'eau et le niveau de performances requis qu'impose ce genre d'applications. Les performances électriques sont assurées par le type de construction avec gaine métallique des câbles de transmission. Cependant, en vue de produire ces câbles efficacement, des matériaux d'isolation aux propriétés particulières sont requis.

Mots clés: PRC, sous-marin, MT, HT

- 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.