Tenerife – La Gomera submarine interconnector: design, engineering and construction of very deep installations of 3-core power subsea cables

Álvaro FRANCÉS-PÉREZ, Red Eléctrica (Spain), alvaro.frances@ree.es
Dimitrios KOSTOPOULOS, Prysmian Powerlink S.p.A, (Italy), dimitrios.kostopoulos@prysmiangroup.com

ABSTRACT

The future interconnector between the Spanish islands of Tenerife and La Gomera is a major engineering challenge for both Red Eléctrica, TSO of Spain, and Prysmian Powerlink, supplier for this project. This interconnector, consists on two circuits at 66kV, of 50 MVA each one. The two submarine cables will electrically connect Tenerife with La Gomera, through XLPE and EPR insulated cables.

KEYWORDS

Submarine cable

Interconnector

XLPE

EPR

Cable armouring

HDD

Non-magnetic armour

Testing

Cable installation

Synthetic Fibres

PROJECT BACKGROUND

The submarine interconnector between the islands of Tenerife and La Gomera (Spain) is a major milestone in the fulfilment of the Electrical Planification published in the article 4 of the Spanish "Ley del Sector Eléctrico, Ley 24/2013".

This project is justified due to the strategic importance for the Canary and Spanish mainland electrical grids, according to the Spanish energy transition targets included in the "Plan Nacional Integrado de Energía y Clima 2021-2023". Considering that La Gomera island energy supply is currently obtained from a Thermal Power Plant, this project will contribute to the economy decarbonisation, reduction of greenhouse gas emissions and to achieve the renewable energy integration for reaching the 100% of renewable energy generation by 2050.

In this sense, this interconnector will facilitate the connection of more renewable energy power plants, mainly in La Gomera, what will have a direct impact in the reduction of generation costs, and improvement of the Canary Islands electrical grid availability and reliability.

This interconnector will consist of two circuits of 50 MVA each one, at 66 kV, that will connect both islands through XLPE and EPR insulated cables, having three main sections: a land section in Tenerife of 5 km approx.., a submarine section of 36 km approx. and a land section in La Gomera of 1 km approx.

Very deep installations of 3-core HVAC cable

The future interconnector between the Spanish islands of Tenerife and La Gomera is a major engineering challenge for both Red Eléctrica, TSO of Spain, and Prysmian Powerlink, the EPC supplier of this project due to the boundary conditions of the site in which the cables will be installed.

The Canary Islands geography, where both Tenerife and La Gomera islands are located, is well known for its volcanic origin. Despite the relatively small area of habitable land above them, there we can find the highest mountain of Spain (El Teide peak, with 3715 m). The same orography can be found below the waters surrounding both islands.

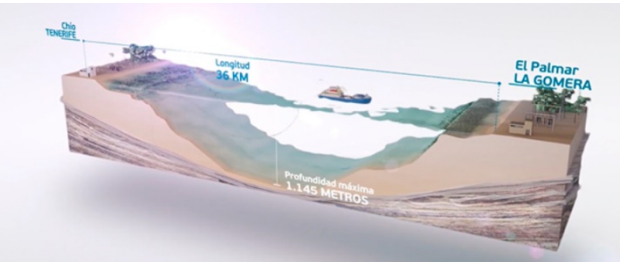

Figure 1 Sketch of Tenerife-La Gomera interconnector

Due to the high depth found in the corridor between Tenerife and La Gomera islands, a new concept of 3-cores submarine cable to withstand the mechanical efforts of its installation at 1.150 m.w.d. is to be designed by Prysmian Powerlink.

Despite other HVDC interconnectors are installed deeper than 1.150 m, this figure of water depth is a world record for AC 3-cores' cable systems. The cable design will thus be lighter than other 3-core cables by employing synthetic materials and PE instead of galvanized steel which is typically used in submarine power cables and constitutes 30 to 50% of the total weight of the cable.

Conventional steel designs although possible to be installed at high water depths, in general are subject to significant installation loads for installation water depths beyond 600 to 800 m for three core cables and 1200 to 1500 m for single core cables. This increases risks and costs for cable installation and eventual repair operations.

To reduce installation risks in high water depth applications submarine cables shall be designed to be as light as possible, without compromising mechanical and electrical properties. The desired cable weight reduction has been achieved by introducing an innovative concept of armour with high modulus synthetic fibres within a PE jacket. Although innovative it is not the first time such design has been qualified and installed, with the first project