

## THE HAWON-ANJWA PROJECT: DEVELOPMENT AND INSTALLATION OF THE AC 154KV XLPE 3CORE OPTICAL COMPOSITE SUBMARINE POWER CABLE SYSTEM

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### ABSTRACT

HVAC submarine power cable system is usually supplying power from mainland to near islands or offshore wind farms in a relatively short distance from the shore end. The Hawon-Anjwa project is interconnection project which connects the main land with one of the islands in Korea to transmit the power. The system voltage of this project is 154kV and it consists of three core XLPE cables with embedded fibre optic cable and necessary terminations. In order to verify this cable system, mechanical and electrical tests are performed in accordance with CIGRE recommendation (Electra No. 171) and IEC 60840. The test results showed that they had sufficient electrical and mechanical properties for the long term use. In November 2010, LS Cable has successfully completed this submarine link project between Hawon (main land) and Anjwa island and it has been energized since then.

### KEYWORDS

3 core submarine cable, Flexible Joint, Repair Joint, Bend restrictor, Fiber optic cable

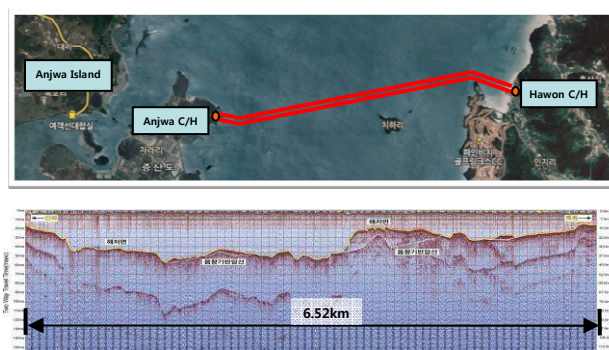
### 1. INTRODUCTION

Hawon-Anjwa project is the double circuit interconnection project between Hawon (main land) and Anjwa island using AC 154kV 3 core XLPE submarine cable. The route length is approximately 7km and maximum water depth is 40m. Detailed marine survey is one of the most important activities in the submarine cable project to avoid any errors or mistakes during the cable laying operation. For this project, not only desktop survey (DTS) but also pre-lay survey was conducted as part of the marine survey. After gathering all the information from DTS and pre-lay survey, the route conditions were thoroughly investigated and examined. According to the result of marine survey, the cable laying and burial method and protection methods were determined. Due to the strong wind, fast tidal current in the cable route, the actual installation was quite challenging. In this paper, not only the installation but also development, qualification tests as well as commissioning of the system are described. The Table 1 is show the specification of submarine power cable and some of the hydrological data of the cable route.

**Table. 1: Specification of Cable and Hydrological Data**

Item	Description
Cable specification	154kV XLPE 3core 500mm <sup>2</sup>
Total length	Approx. 7km × 2circuits
Laying method	Simultaneous laying and burial (2 circuits)
Tidal/wave	Tidal: Max. 6.1knot(about 3m/s) Wave : 1~2.5m
Max. water depth	40m

To choose the final cable route, measured the seabed profile as well as navigation and safety consideration, confirmed the final path of the cable. The fig 1 shows the overhead and profile view cable route.



**Fig. 1: Overview of Cable Route**

### 2. DEVELOPMENT OF THREE CORE SUBMARINE CABLE AND REPAIR JOINT

#### 2-1. THREE CORE SUBMARINE CABLE

The design requirements of AC 154kV XLPE 3 core fibre optic embedded power submarine cable system are summarized in Table 2.

**Table. 2: Requirement of submarine cable**

Item	Designed value
System Voltage	AC 154kV
Maximum Voltage	AC 170kV
BIL	750kVp

Fig. 2 and Table 3 show the configuration and dimension of 3 core cable.