



Case Study

Transmission Cable Commissioning & Diagnostic Testing



LAND & SUBSEA CABLE COMMISSIONING

A large utility in Europe requested the commissioning and diagnostic testing of a hybrid transmission cable system (3 cables land and subsea) over 40 km in length rated at 220 kV-230 kV phase to phase terminated between a transmission substation to a remote Gas Insulated Substation (GIS) mounted on an offshore platform.

Land & Subsea Cable Commissioning
Year: 2017
Service: Transmission Cable Commissioning & Diagnostic Testing
Location: Denmark, Europe



TESTING REQUIREMENT

- Perform commissioning testing in compliance with IEC 62067 standards at $1.7U_0$ for 60 minutes at testing frequency (20-300Hz).
- Perform Partial Discharge Diagnostic testing on the cable accessories including joints for the onshore cable section and terminations both onshore and offshore.

EQUIPMENT REQUIRED

1. Six (6) Resonance test systems (RTS) rated (260 kV / 83 A) connected in a parallel configuration. Each with 22MVA reactor fed by 220 KVA exciter transformer
2. An additional 220 KVA exciter transformer for a total of seven (7) feeding units
3. Synchronized diesel generators rated at 4.2 MVA to power up the RTS network
4. Capacitive Sheath Partial Discharge Sensors to be installed near the direct buried joints on the land cable sections
5. High Frequency Current Transforms (HFCT) partial discharge sensors to be installed at the cable terminations on both ends

EQUIPMENT SET-UP

- Kinectrics manufactured and supplied the required capacitive sheath sensors to the client on time to be permanently installed by the cable manufacturer and installer.
- The six (6) Resonant Test System network with the additional exciting transformer was assembled by Kinectrics engineers and technicians at the remote transmission substation.
- Kinectrics engineers and technicians installed the daisy-chained partial discharge monitoring devices on each of the land cable section joints connected via the preinstalled multimode optical fiber cables.
- Kinectrics engineers and technicians installed High Frequency Current Transformers (HFCT's) on the terminations both onshore and the remote platform 40km offshore.
- Kinectrics engineers and technicians installed seven (7) 600kVA synchronized diesel generators to power up the network of RTS systems.

SUCCESSFUL TESTING

Kinectrics successfully completed commissioning the AC Hi-Pot test with partial discharge diagnosis on a 220 kV hybrid cable system (Land and Subsea) terminated at a GIS on a platform approximately 40 km offshore.

Using six (6) Resonant Test Systems rated at 260 kV/83 A each connected in a parallel configuration and an additional control feeding unit powered by 4.5 MVA of diesel generators, we were able to successfully apply 227 kV phase to ground equivalent to 1.7U₀ of test voltage on each of the 3 cables for 60 minutes in compliance with IEC 62067 Standards.

During the commissioning testing, Kinectrics used our synchronized daisy-chained partial discharge monitoring system, configured via the multimode optical fiber cables, to monitor and record PD activity on the land cable section accessories. In addition, at the remote platform termination on the GIS approximately 40 km offshore, Kinectrics used a real-time Partial Discharge monitoring system to record and diagnose PD activity on each of the 3 cables using local 4G LTE network.

RESULTS

The combined AC Hi-Pot at 1.7U₀ with Partial Discharge diagnosis testing provided our test engineers with accurate test results in compliance with the IEC 62067 standards, and in turn, our client with a higher confidence level regarding the overall health and the installation quality of the cable system.

Kinectrics was able to achieve the required test voltage at 1.7U₀ and maintain it for 60 minutes as required by the client and the industry standards. During the commissioning testing, we monitored and recorded the partial discharge activity on all the land cable section joints and terminations onshore at the substation end, and at the platform GIS 40km offshore. The cable system passed the required testing and was reported fit for service.