

# Long Length XLPE Cable Deterioration Testing System

## Background

XLPE cable plays an important role in power transmission and distribution systems. Introduction of XLPE cable into the power grid began in the 1970's, and rapidly increased in the 1980's, therefore currently there is an increasing amount of highly aged XLPE cable which has been in operation for more than 30 years. In light of this situation, investigation on the deterioration of electrical insulation for such highly aged XLPE cable is an

important challenge in supporting the establishment of the strategic replacement plans for the operating equipment, by high voltage tests with removed XLPE cable. This testing system aims to reveal the cause of deterioration of electrical insulation in the removed long length XLPE cable of 200-m length class, and adopts a pre-breakdown discharge detection technique.

## Outline

This testing system consists of a 500 kV AC transformer to apply high voltage to the XLPE cable specimen enough to ignite the discharge in it. The pre-breakdown discharge detection technique is the most important technique in this testing system, in order to prevent the breakdown

and burning out of the deterioration cause, by effectively detecting partial discharge, which is the precursor phenomenon of the breakdown, and locating it. Partial discharge free cable terminations are also adopted to increase certainty.

## Specifications

High voltage source

Maximum output voltage: 500 kV (no partial discharge), Maximum capacity: 1000 kVA  
Capacity of power source is reduced by resonance inductance.

A high speed breaker is introduced to shut down the voltage application within 100  $\mu$ s.

XLPE cable termination

Two sets of water termination systems are adopted.

Maximum voltage: 250 kV and 600 kV

Forced circulation of ion-exchanged water is adopted for high voltage insulation and cooling.

Experimental hall

Height: 11m, Capacity of overhead traveling crane: 1t, Turntable: 10 m in diameter

## [Installed location and date]

Yokosuka area / March, 2013

\* The water termination system sustains high voltage insulation by filling up the ion-exchanged water in it to prevent discharge noise in high voltage testing.

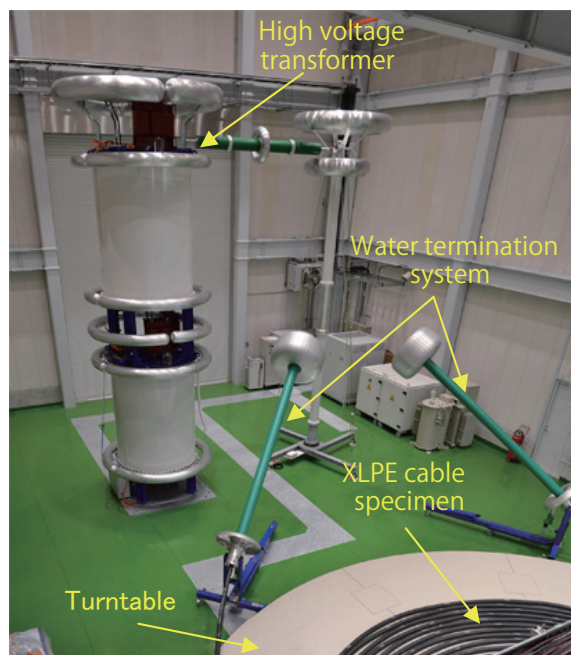


Photo: Long Length XLPE Cable Deterioration Testing System