

## Case Study

### Partial Discharge monitoring of MV Switchgear

Ref: FP41

#### 11kV & 22kV panels

Jan 2013



**Outline** Crossrail is a new 118km railway line being built from Maidenhead, West of London, to Abbey Wood, East of the capital. The track will pass through 21km of twin bore tunnels running directly under the centre of London.

The tunnels are being bored directly through the centre of London, passing underneath many landmark buildings and important infrastructure including two large substations that are critical to the capital's distribution power network. The works introduce the possibility of subsidence and ground movement that could disturb the switchboards.

Partial discharge tests carried out in Oct 2012 showed that the switchboards were free from PD. A permanent PD monitoring system has been installed in both substations in order to continuously check the switchgear for PD and raise alarms if any PD is initiated as a result of the underground works.

<b>Component Sections and Tees</b>	11kV and 22kV switchboards
<b>Engineer(s) responsible/contact</b>	N/A IPEC Ltd



Maps showing tunnel route and sub locations



The Crossrail tunnel is scheduled to pass under the two substations, Dukes St and Short's Gardens between January and March 2013.

### Details

Duke St substation is an underground substation built in 1905 and the 11kV switchgear dates from the late 1980s. Short's Gardens has both 11kV and 22kV switchgear that date back to 1953.

Previous evidence has indicated that the tunnelling works may introduce ground movement of up to 14mm. This change in ground level could happen over a prolonged period of time and therefore any consequential effects on the health of the switchgear could occur a long time after the tunnelling has taken place.



A permanent PD monitoring system has therefore been installed in order to benchmark the condition of the switchgear prior to the works and to continuously monitor for the onset of PD as the works progress.



The monitors have been installed with both capacitive TEV PD sensors and ultrasonic acoustic PD sensors so that any degradation to both insulation surfaces and internal insulation will be detected and raise alarms.