

High Voltage Testing Services GAS PLANT

HV COMPONENT REPLACEMENT

In many cases larger HV assets fail testing requirements, or more critically break down in service conditions, due to faulty minor components. These components often include Voltage Transformers, Current Transformers, cable terminations and joints. With effective testing faulty components can be identified prior to failure. This allows replacement items to be sourced and installed at a relatively low cost during a scheduled shutdown, maximising the lifespan and performance of the asset.

PROJECT DESCRIPTION

To determine REFCL compliance and provide a condition assessment for all site HV assets, high voltage testing was performed for a private high voltage network customer. Like many private network customers, the site included an incoming cable, metering cubicle, feeder cable and transformer.

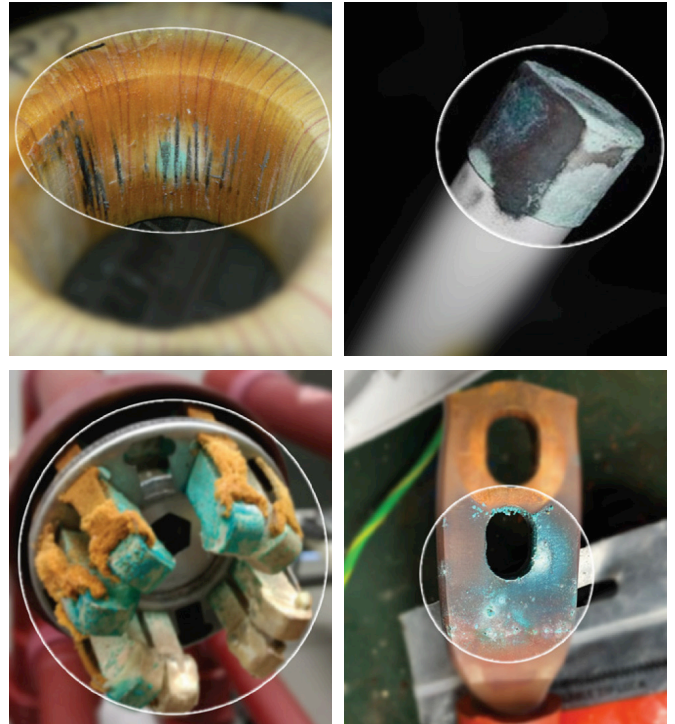
In addition to a detailed inspection, Partial Discharge (PD), Dielectric Dissipation Factor (DDF) and monitored withstand testing was performed on all HV assets in isolation. Dependent upon the capacitance of the item being tested, 50 Hz or VLF (0.1 Hz) test sets were used for energisation of the assets.

SWITCHGEAR FINDINGS

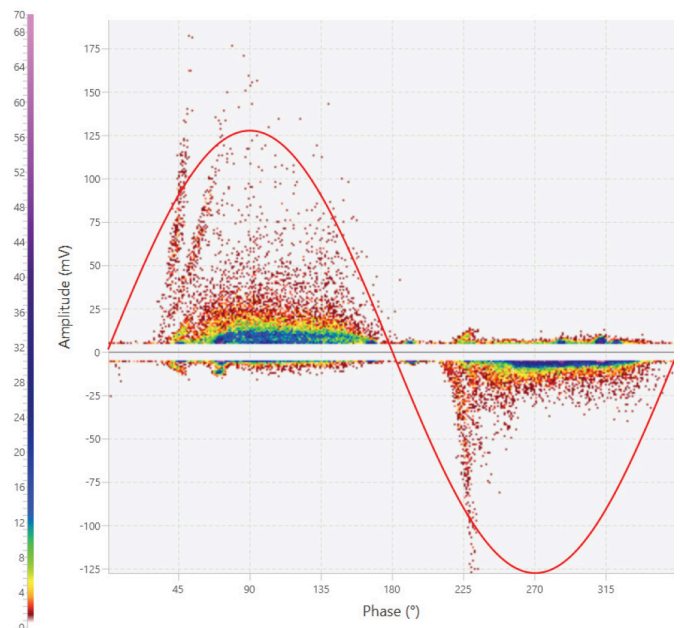
During the initial isolation and inspection of the site assets, corrosion and oxidation were observed and noted on several components inside the switchgear cubicle. A by-product of Partial Discharge is the release of ozone and nitrous oxide, this commonly results in visible corrosion and oxidation on the surface of HV components.

High Voltage PD testing confirmed significant discharge was occurring from multiple locations in the switchgear. Using a combination of PD time of flight techniques, including electromagnetic and acoustic sensors, the offending components were successfully pinpointed. It was determined that the remainder of the switchgear was in good condition with no PD evident.

The root cause of this PD was likely high precipitation and faulty cubicle heater.



Corrosion and Oxidisation



PD Phase Pattern from discharging switchgear

High Voltage Testing Services GAS PLANT

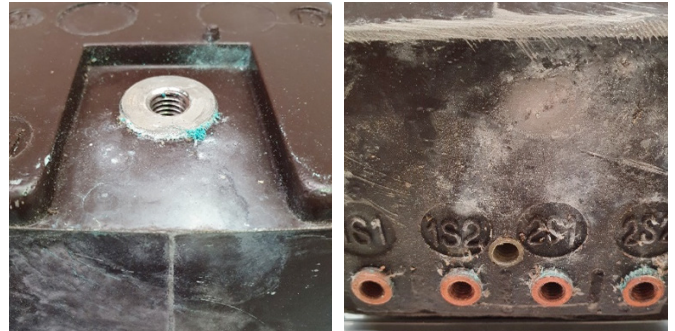
SOLUTION

Following testing the next step was to address the root causes of equipment degradation and replace the faulty components. To regulate temperature and humidity conditions of the switchgear a new kiosk enclosure and cubicle heater were first on the agenda. Once the enclosure was sourced, the switchgear was installed, with faulty CT's and VT's replaced. The entire unit was then craned into place where repeat testing was performed, confirming that all identified issues with the HV network had been resolved.

AVOIDING A CATASTROPHE

In addition to the original scope, LIVE HV was contracted to perform maintenance testing on the switchgear. It was discovered that the UPS & battery backup to the protection system was not operational. The implications here are that the faulty components discharging at service voltage would have eventually led to a failure at which point the protection system is designed to shut off the sites power supply. The faulty UPS and battery backup would have negated the protections system, leading to a catastrophic event, putting any nearby personnel in danger and destroying equipment.

Fortunately, this site avoided such an event following an HV condition assessment and electrical maintenance regime. The entire project from initial testing through component replacement and follow-up testing was performed at a fraction of the assets value, while achieving REFCL compliance, extending asset lifespan and avoiding an impending failure.



Evidence of discharge



Installing new components



New cabinet installation

THE OUTCOMES

Entire site's condition assessed in 1 day utilising concurrent testing

Discharging CT's & VT's identified & replaced

New switchgear cubicle & heater sourced & installed

Follow-up testing completed with the site deemed REFCL compliant

Switchgear maintenance testing prevented a catastrophic event

Functionality of the HV network ultimately upgraded.