



Partial Discharge Testing Service



Wellington, New Zealand

P: + 64 4 568 3499 F: + 64 4 569 9688
Email: sales@rpsswitchgear.co.nz

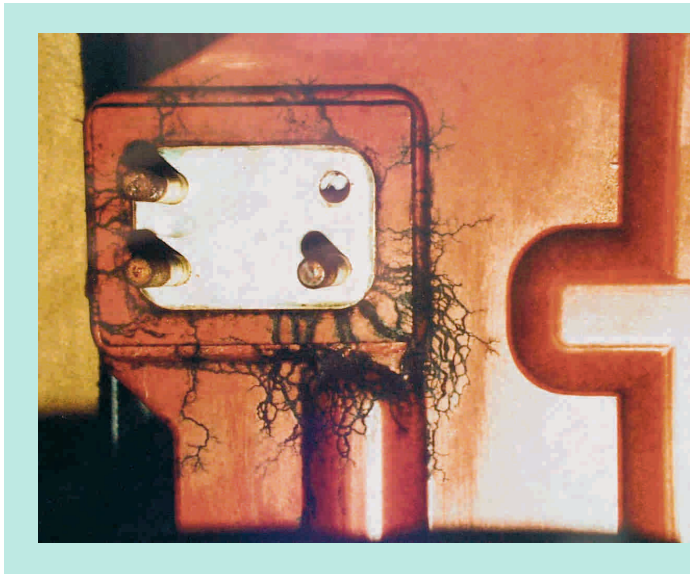
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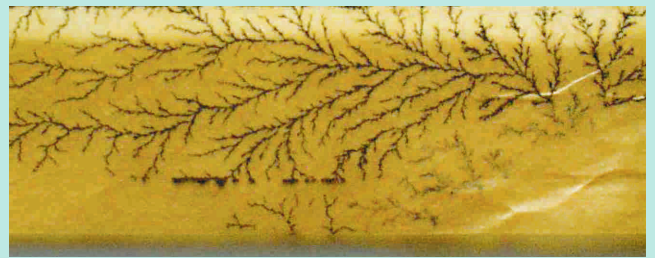
The PD Time Bomb

Partial Discharge (PD) is a potential “time bomb” waiting to explode in your switchgear. Discharge activity can develop under normal working conditions in high voltage equipment where the insulation condition has deteriorated.

PD is an electrical discharge in insulation between two conducting electrodes, it occurs in Metal-clad switchgear under high voltage stress where there are deficiencies in the primary insulation. As the switchgear ages, the risk of PD increases.



Tracking on 11kV Epoxy Resin Busbar



Tracking in Paper Insulation

The Catastrophic Consequences

Undetected PD within insulation will almost certainly increase over time to the point where there is a catastrophic failure of the primary insulation. In the most severe situations the equipment can explode causing a large amount of damage to the electrical system

infrastructure and potentially injure any switchgear operators. Health and safety is a significant factor as older, often oil filled, equipment was not designed for arc fault containment.



Failed 11kV Spout



What We Aim to Prevent!



Why Test For Partial Discharge?

Failure of insulation is the number one cause of HV system failures. International statistics indicate that electrical insulation deterioration causes up to 90% of electrical failures. Data has also shown that as a result of PD testing, less than 2% of switchgear panels require further investigation.

If this small percentage of defective equipment can be easily identified, and serviced, then an extremely high percentage of electrical failures can be prevented. Maintaining existing equipment, in many cases, will be more economic than capital-intensive replacement.

Benefits of the RPS Switchgear PD Testing Service

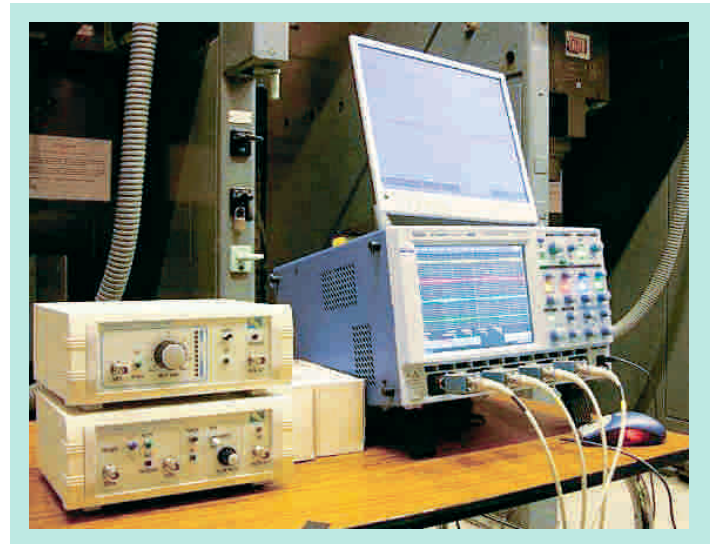
- Early detection of PD can prevent switchgear insulation failures, which can be extremely dangerous and very costly.
- PD testing helps switchgear proprietors to make informed and accurate decisions with regards to maintenance, retrofitting and replacement of switchboards.
- The RPS Switchgear PD test is an “On-Line” test and therefore does not require any power outages.
- Once the PD level of a switchboard is quantified it can be monitored over a period of time and any further degradation will be easily identified.
- If PD is detected on a switchboard, RPS Switchgear technicians are able to track down the PD source to a particular compartment on the offending panel.
- After a PD test has been carried out, RPS Switchgear Engineers can provide a comprehensive report detailing the findings of the test.
- In many switchgear situations RPS Switchgear will be able to offer parts and service solutions without additional costly and time consuming visits and investigations.

The RPS Switchgear Solution

RPS Switchgear advise that users of high voltage equipment develop a PD testing program that ensures the safe and economical operation of both new and aging equipment. That program may involve a range of monitoring options where RPS Switchgear can assist using our experienced service staff and our Portable PD Monitoring equipment.

RPS Switchgear PD Monitoring service can perform:

- **Off-Line PD testing**
This testing can be done either prior to commissioning new equipment or prior to commissioning used equipment that has had any outage. Off-line PD testing is a well known technique and has been widely used in the past.
- **On-Line PD Testing**
This is non-intrusive testing that can be done at any time while the equipment is in service. On-Line PD testing is a newer concept that is now possible due to the latest modern equipment being available.



On-line PD Monitoring Equipment



Offices

New Zealand

RPS Switchgear Ltd
7-17 Bouverie Street
Petone
Private Bag 39811
Wellington Mail Centre
New Zealand
Tel: + 64 4 568 3499
Fax: + 64 4 569 9688
sales@rpsswitchgear.co.nz
www.rpsswitchgear.co.nz

Australia

Melbourne
RPS Switchgear Pty Ltd
Office 8 – 11,
2187 Princes Highway
Clayton, Victoria 3168
Australia
Tel: +61 3 8558 7200
Fax: +61 3 9548 4833
sales@rpsswitchgear.com.au

Brisbane

RPS Switchgear Pty Ltd
1/26 Argyle St
Albion 4010
Queensland
Australia
Tel: +61 7 3862 1499
Fax: +61 7 3862 3545
sales@rpsswitchgear.com.au

Europe

RPS Switchgear
3 Glen Ailinne
Drumshanbo
Co. Leitrim
Ireland
Tel/Fax: +353 71 964 0561
Mobile: +353 86 810 5788
sales@rpsswitchgear.co.uk

South Africa

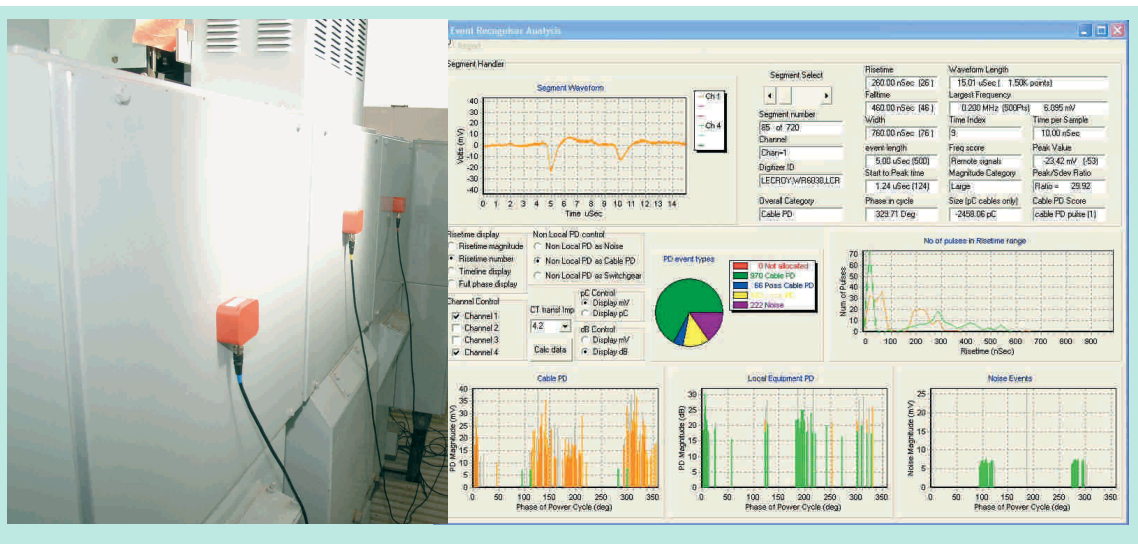
RPS Switchgear
PO Box 1498
Walkerville 1876
South Africa
Tel/Fax: +27 11 949 1565
Mobile: +27 83 676 3988
sales@rpsswitchgear.co.za

RPS Switchgear Partial
Discharge Jan08. This
brochure is intended as a
guide only and the latest data
should be obtained from our
sales department.

How does On-Line PD testing work?

Transient Earth Voltage (TEV) sensors are magnetically attached to switchboard panels (below left). Signals from the TEV sensors are then transmitted to a high-speed oscilloscope, which can record data at 2.5 GS/s.

The test equipment's software (below right) then analyses the data, removing noise, and identifying PD pulses providing meaningful PD data.



TEV sensors (red) attached to switchboard panels

Screen snapshot of PD software processing recorded data

The On-line PD software quantifies the PD levels in terms of decibels. The chart below is a guideline for interpreting the PD level recorded. Following a PD test, RPS Switchgear engineers will examine the data

recorded by their technicians and provide a report that details the magnitude and volume of PD recorded. RPS Switchgear engineers can also make recommendations based upon the findings.

CATEGORY	ACTION
0	No insulation difficulties. Can be left out of any monitoring program. Re-test as legally required.
1	Some discharge but probably not implying short term failure. This should be re-tested routinely to watch for any change.
2	System is quite active, but still not likely to fail in the very short term. This needs to be monitored, or retested soon. Prudent system operators may choose to act now.
3	Significant discharge, and some monitoring should be installed immediately. Recommend that plans be put in place to locate and find the origin of the PD activity.
4	Serious, and the substation should be restricted. The switchgear should be tested offline, the PD origin located and repaired.



RPS Switchgear Ltd

Marketing and distribution extend throughout Australia, New Zealand, Europe, Africa, South East Asia, Hong Kong and China. Manufacturing operations are complemented by a comprehensive range of customer services throughout Australia, New Zealand, Europe, Africa, South East Asia, Hong Kong and China.