



# Service Catalogue

Substations, Cables, Transformers, and Training.



[www.eatechnology.com](http://www.eatechnology.com)

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# Maximising value from your Electrical Asset

In simple terms asset management is all about delivering maximum value from your assets. EA Technology specialise in electrical assets. We are global leaders in asset management and have contributed significantly to the advancement of this field. We played a key role in developing and reviewing the ISO 55000 series of standards, ensuring that assets are specified, designed, acquired, operated, maintained and disposed of sustainably to deliver maximum value and achieve business objectives. Wherever you are on your asset management journey EA Technology can support and add value!

## You might need help to:

- Improve asset maintenance and inspection activities
- Better understand the condition of your assets
- Understand the risk presented by you assets
- Ensure compliance with statutory regulations and standards
- Consolidate your existing activities into an Asset Management System
- Improve asset management awareness and competency
- Develop risk-based investment planning



Also if you want to understand your strengths and weaknesses, then EA Technology can undertake a gap analysis and recommend a roadmap for improvement. If you have an objective for ISO 55001 Asset Management Certification, EA Technology are Endorsed Assessors under the Institute for Asset Management (IAM) Endorsed Assessor scheme that covers assessment against ISO 55001 for gap analysis and/or certification. So, contact us to explore how EA Technology can help save time and money while improving the performance of your electrical assets. Better asset management means fewer breakdowns, less costly repairs and improvements in efficiency and productivity.



# Partial Discharge (PD) Surveys for High Voltage Substations

Expert independent condition assessment of your power assets including continuous monitoring

Measuring partial discharge (PD) activity in your High Voltage/Medium Voltage (HV/MV) assets gives you a clear picture of the true condition of your power assets, so you can schedule your maintenance programme based on actual condition rather than time intervals, saving you both time and money. EA Technology can conduct a full PD Survey of all your power assets, giving you the benefit of a concise report, accurate results and expert analysis.

## Business Benefits

- Improve operator safety and network reliability
- Early identification of any deterioration will eliminate unexpected disruption and failure and provide accurate condition assessment
- Eliminate the need to invest capital in survey instruments and staff training
- Non-intrusive – no shutdown required for survey
- Provides compliance with the recommendations of HSG 230 (Health and Safety Executive guidelines, keeping Electrical Switchgear Safe)

## Features

- Survey conducted using our advanced PD location and measuring equipment
- Your results compared on an asset-specific basis with our unique database of over 20,000 test records
- Concise report provided with clear recommendations
- Instruments measure Transient Earth Voltages (TEVs) and Ultrasonic activity
- Reassurance of a totally independent survey and report provided by expert engineers with over 40 years' experience in interpreting PD data



## What is PD?

A partial discharge is an electrical discharge or spark that bridges a small portion of the insulation between two conducting electrodes in HV assets. Over time this can degrade the insulation leading to failure. For further details on Partial Discharge watch our short videos at:

<https://eatechnology.com/resources/blogs-white-papers/what-is-partial-discharge-a-guide-to-understanding-and-managing-pd/>

## Why measure PD activity?

Once present, PD activity always increases and, if left undetected, will deteriorate towards a failure which can be sudden and catastrophic. Our survey conclusions are totally independent as we do not manufacture, refurbish or maintain HV/MV assets. PD activity is the most reliable indicator of the true condition of insulation within live assets.



### Did you know?

**85% of disruptive substation failures are PD related.**

## How will a PD Survey help you manage your assets?

EA Technology's experienced service team can be deployed worldwide with the latest technology to test for and identify PD activity in all substations. Combining their knowledge with our world leading range of instruments to detect, locate and measure PD activity, our expert engineers will conduct a thorough survey of all your live substation assets. In the case where HV assets are in areas of high electrical noise or there is a suspected intermittent fault, we can install continuous monitoring equipment for a period to measure activity.

We then conduct detailed analysis based on our experience of over 40 years of interpreting PD data to provide the most accurate prediction possible of future deterioration and failure. You will receive an easy-to-understand 'traffic light' status report with clear and totally independent recommendations for managing your power assets based on their true condition.



# Identify problem areas early with Thermographic Surveys

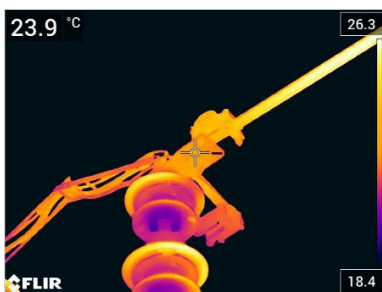
EA Technology's Thermographic Survey service provides key data for condition-based asset management by identifying 'hot-spots' on contacts of open busbar high voltage switchgear and low voltage equipment. Such 'hot-spots' identify areas of poor contact that may require further investigation.

We use Infrared (IR) cameras to identify 'hot-spots' on switchgear and low voltage equipment, caused by ohmic heating, which may be an indication of problem areas. The camera measures and captures an image of the emitted infrared radiation from an object. As the infrared radiation emitted is a function of the surface temperature of the object it is possible for the thermal imaging camera to capture and display this temperature. The information is saved onto the camera during the survey and downloaded for analysis and inclusion into a report.



- A simple, non-invasive test.
- Quickly identifies 'hot-spots' on contacts.
- Provides essential asset condition data.
- Cost-effective.
- Available for all open busbar high voltage switchgear and low voltage equipment.

The example below shows a difference of over 20 degrees between phase 2 (LHS image) and phase 3 (RHS image). This could be a loose connection resulting in higher resistance, or phase 2 being overloaded.



The survey is quick and easy and can be conducted on any equipment where the conductors and contacts can be safely exposed. Thermographic Surveys provide a comprehensive assessment of a range of asset types and can prove highly cost-effective in identifying faults before they lead to failures. Thermographic surveys are often carried out by EA Technology in conjunction with our other services, such as Partial Discharge surveys.

# Vacuum Interrupter Testing

Using our portable MAC Test set, our specialist engineers can assess the health of Vacuum Interrupters (VI) in-situ.

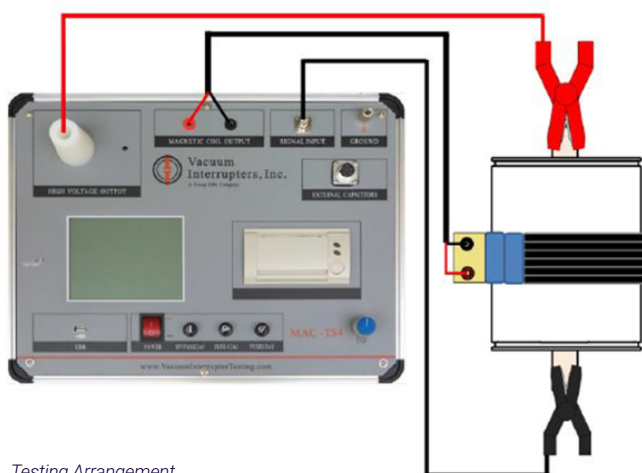
Vacuum Interrupter manufacturers have historically measured the internal pressure within their devices using a magnetron. Until recently, the magnetron was very bulky and difficult to use in the field and was therefore relegated to manufacturer laboratory testing. This same test is now available in a portable unit and can be used to assess the condition of vacuum interrupters

## What is MAC Vacuum Interrupter Testing?

The normal high voltage and/or contact resistance tests will enable you to check the integrity of the VI before re-energising. However, these are go/no-go tests which do not give information on the level of vacuum in the VI, which may be degrading (known as “virtual leakage”). The Magnetron Atmospheric Condition (MAC) test allows the internal pressure of the VI to be measured.

By measuring the internal pressure, it is possible to not only determine whether the VI is functional (go/no-go), but also, by repeated measurements to establish trending, estimate the number of years of remaining useful life. In addition, a more complete health check can be completed by combining with other fairly readily available information (number of operations and contact wear).

A report will be produced with recommendations on future maintenance action.



Testing Arrangement.

# Cable Condition Assessment Service

Our cable condition assessment service offers a thorough review of the status of your cables with two offline testing methods. PD cable mapping reveals minor insulation failures before they become critical, while Tan Delta(TD) testing to IEEE 400.2 uncovers water tree growth that could otherwise go undetected and reduce the life expectancy of XLPE insulation. Our process ensures thorough safeguarding for peace-of-mind assurance in each test.

## Benefits of cable condition assessment

- Fast and accurate site service.
- Works with paper and polymeric insulated cables.
- Reduces the need for expensive excavation work.
- Ideal for pre-commissioning and post-repair tests.
- Locates PD activity in cables BEFORE it leads to failures.
- TD testing can detect water treeing of cable insulation, Not detectable by PD testing.
- Reduces the risk of unplanned, expensive outages.



Phase-resolve PD pattern

## PD Cable mapping service testing

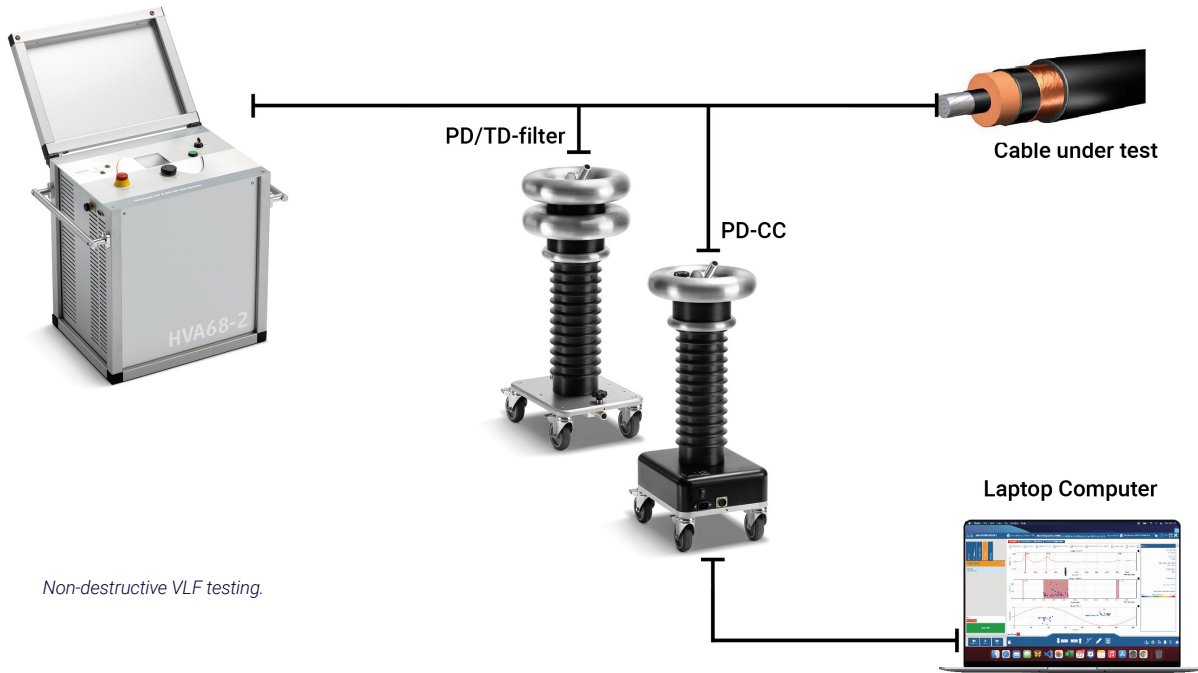
With over 60 years expertise in the electricity industry, our PD Cable Mapping Service works on the principle of energising HV cables at Very Low Frequency (VLF), making the system very portable and requiring only a 13Amp 230V supply.

Time-of-flight measurements are used to calculate cable length, and all captured data is processed using bespoke software to calculate the location and magnitude of recorded PD waveforms. Our system has a 25 year track record of success from the UK to the Far East.





High voltage power supply



Non-destructive VLF testing.

## Multiple applications

The service is effective on all types of HV cable. Paper insulated cables can be tested to approximately 6km in length and polymeric insulated cables up to approximately 10km in length.

Pre-commissioning	Checks the condition of cables and joints before they are put into service
Post-repair	Safely tests the integrity of cables that have been repaired WITHOUT the risk of overloading the cable, an inherent problem with 'withstand' tests
Fault Detection and Diagnosis	Identifies PD in cables and joints at an early stage of their development, BEFORE they lead to disruptive failures
Condition Data Gathering	Collects information on the condition of cable assets, including confirmation that cables are free of PD
Risk analysis	Enables the production of a Health Index for each cable asset so that the probability and consequences of failure may be calculated
Investment Prioritisation	Empowers asset managers to make intelligence based decisions on cable maintenance and replacement strategies

## Conclusion

Cable operators now have access to a cost-effective way of testing their assets for fault finding and longevity. Testing serves as an invaluable process that can boost the life expectancy of crucial investments. By using cable PD mapping and TD testing, you get a better overview of the condition of your cable and identify the issues in a more accurate way. With this information, you can then decide on the best plan of action to take in order to fix any problems, ensuring that your cables have a long and healthy lifespan.

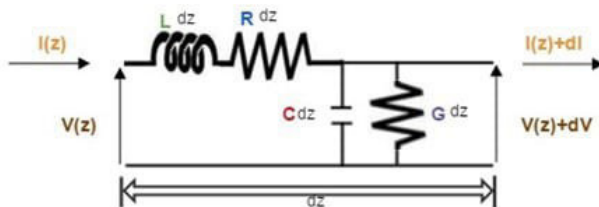
# Cable Line Resonance Analysis (LIRA)

Non-destructive testing of cables that do not require them to be energised to high voltages. Safer than alternative methods in 'high risk' environments.

LIRA can be carried out on electrical cables hundreds of kilometres in length and is becoming increasingly effective for condition monitoring, or fault location, in long length cables (for example submarine cables connecting off-shore platforms to the grid).

LIRA can test for and detect numerous types of faults and defects in insulation including temperature and radiation damage, moisture ingress and mechanical impact to name a few. LIRA relies on the correlation between insulation's condition and its dielectric constant (mainly capacitance) and calculates the impedance spectrum (amplitude and phase) as a function of the applied signal over a wide frequency band.

The capacitance of a cable changes as a function of changes in the cables permittivity and changes in the cable's radius, as shown below:



- R = series resistance
- L = series inductance
- G = parallel conductance
- C = parallel capacitance

$$C = \int_0^L \frac{2\pi \epsilon_r(Z) \epsilon_0}{\ln \left( \frac{r_o(Z)}{r_i(Z)} \right)} dz$$

Changes in permittivity

Changes in radius

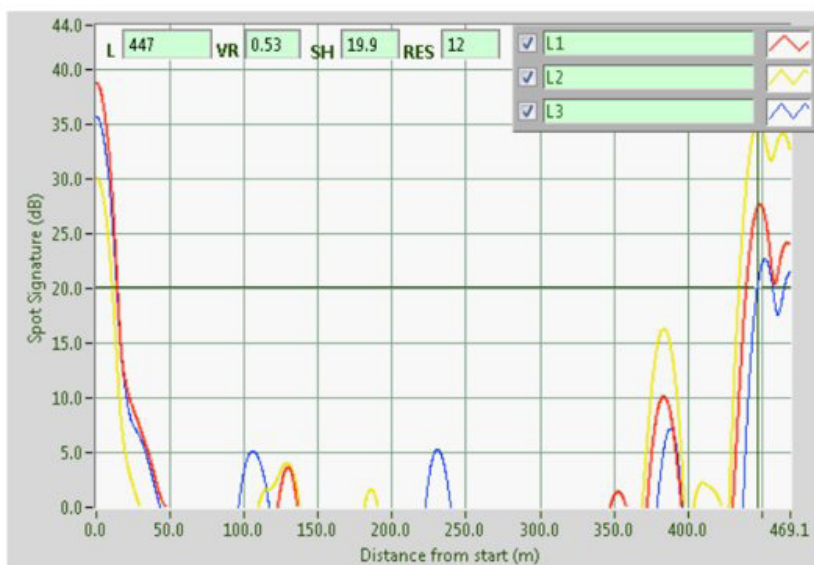
Changes in the permittivity and radius of the cable change the localised impedance. Impedance irregularities cause reflections, with the largest irregularity being at the end of the cable. By analysing standing wave patterns on short and open circuits, LIRA allows the easy detection of changes in impedance.

## Benefits & Features

- LIRA is capable of being used on cables that are hundreds of kilometres in length, unlike other test methods such as VLF that are often restricted to cables of perhaps 10km.
- Suitable for cable testing where energising to working voltage is of concern.
- Can be used to provide initial cable 'fingerprinting', so you can easily recognise when a fault has occurred on a cable. This approach provides the best results.
- Accurate detection of changes in impedance.
- Localising of faults to within 0.3% of the cable length.
- Can locate joints on circuits where they would be otherwise unknown
- LIRA can detect the following phenomena:
  - Global insulation degradation
  - High temperature damage
  - Moisture ingress
  - Radiation damage
  - Mechanical effects/defects

### \*Note:

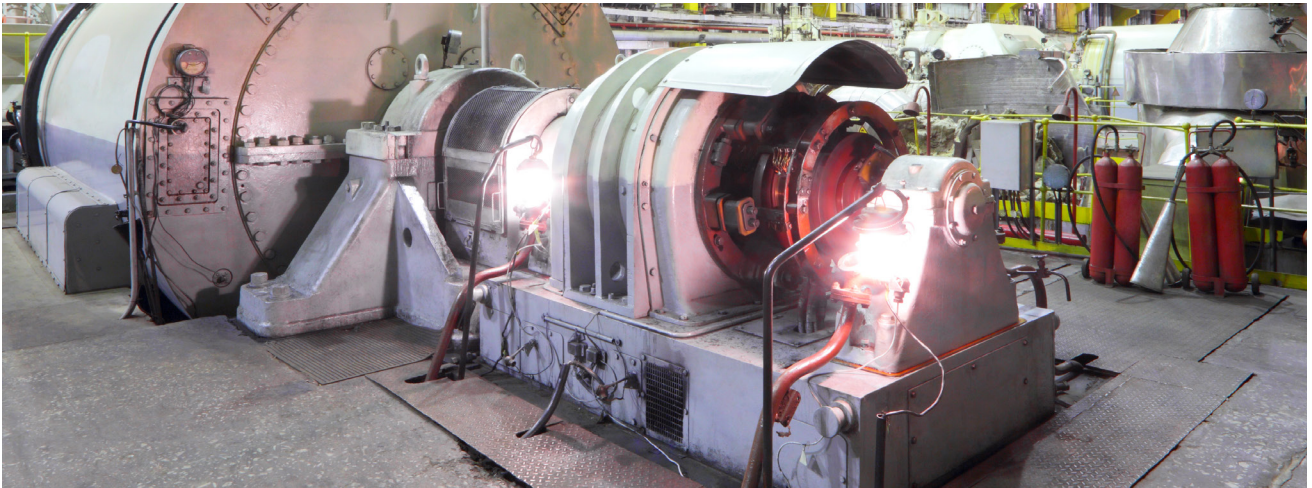
For the highest sensitivity, testing from both ends of a cable is recommended to overcome some signal loss across multiple impedance changes, although this is not a necessity.



LIRA Signature Graph

# Rotating Machine Condition Assessment Service

Insulation diagnostic tests to assess the condition of motors and generators.



## What our Rotating Machines Condition Assessment Services offers you:

EA Technology's Rotating Machines Condition Assessment can provide a comprehensive range of insulation diagnostic tests to assess the condition of motors and generators. Rotating electrical machines (motors and generators) are often regarded as the most critical components in power generation and industrial production facilities where unplanned downtimes due to in-service faults can be very expensive.

Our full suite of state-of-the-art test equipment can provide a comprehensive range of insulation diagnostic tests to assess the condition of motors and generators. Results can be used to identify machines at risk of catastrophic in-service failure, to improve performance and to extend reliable service life. The equipment is very portable and can be easily transported to most remote locations requiring only 110-230V/50/60Hz mains supply.

## Benefits of the service:

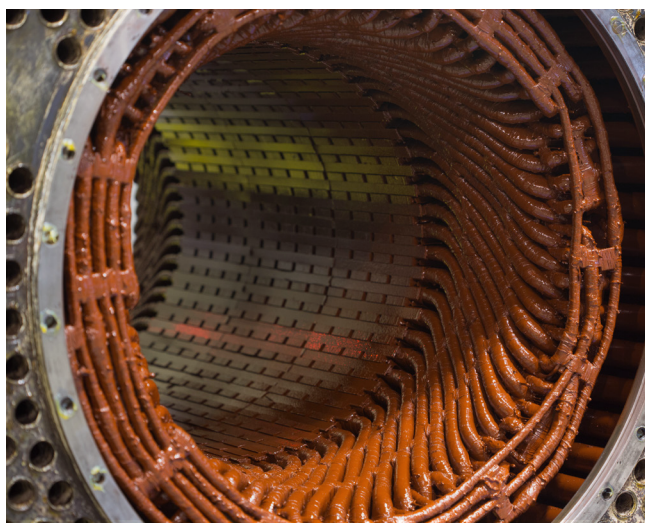
- A full suite of state-of-the-art off-line tests on stator and rotor winding insulation
- Helps to avoid expensive in-service failures and downtime
- Provides essential data for cost effective asset management
- Rotating machines condition assessment service is carried out by highly trained personnel who are expert at assessing the condition of stator insulation
- All stator insulation diagnostics tests are carried out at 50/60Hz power frequency and in accordance to industry recognized standards
- Highly portable equipment requiring only 110-230V 50/60Hz mains supply

As well as being an essential part of condition-based asset management, Rotating Machine Condition Testing should also be undertaken when a new motor or generator is commissioned as a fingerprint data collection for later comparison, following repairs and to diagnose faults.

Regular Rotating Machine Testing, to identify faults early, will minimise expensive replacement costs as well as help to extend reliable service life of the rotating machine

## Rotating Machines Condition Assessment Testing

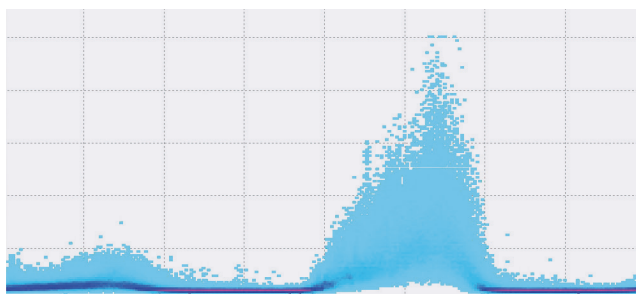
EA Technology knows that 85% of power failures can be attributed to PD in electrical assets. Our unique service gives companies and networks the peace of mind to trust their assets are being thoroughly monitored around the clock.



Partial Discharge Testing for the assessment of stator insulation condition

## Recommended Tests

- **Partial Discharge (PD) Testing:** PD measurement is widely regarded as one of the best methods for the assessment of the stator insulation condition. The PD test allows for single weak spots in the insulation system to be clearly identified.
- **Capacitance and Tan Delta (Tan  $\delta$ /DF/PF) Testing:** To assess the condition of the bulk of the insulation and degradation over time
- **Sweep Frequency Response Analysis:** Allows to detect inter turn faults in the stator and rotor windings caused by mechanical stress
- **Voltage Withstand Testing:** A simple 'Go/No Go' test to identify weak insulation unsuitable for service
- **DC Winding Resistance:** Performed to detect any possible problems with contacts soldering and loose connections in the stator and rotor windings
- **Insulation Resistance (IR) and Polarisation Index (PI):** To assess the condition of the stator and rotor insulation for contamination and moisture ingress using DC voltage
- **Pole Drop Testing:** To detect inter turn defects like short circuits in the rotor windings which could cause magnetic imbalance contributing to higher shaft vibrations and resulting stresses to the bearings
- **Dielectric Response (FDS + PDC) Measurement:** A very sensitive measurement to reliably establish moisture levels in solid stator insulation and detect levels of contamination



Partial Discharge Testing for the assessment of stator insulation condition

# Transformer Diagnostic Testing

Power transformers are among the most strategically important and expensive components on any network, and data on their health is therefore vital for effective asset management.

## Business Benefits

- Develop Health Indices to estimate end-of-life
- Check condition following fault conditions or overloading
- Extend transformer life
- Maintain high utilisation of existing transformers
- Improve loading capabilities
- Identify transformers at risk of failure
- Prevent expensive and disruptive failures
- Minimise replacement costs
- Improve decision making for future load requirements
- Improve safety

## Market-leading service partners

- EA Technology has 40+ years' experience of working with electricity asset operators
- We provide comprehensive on-site testing and analytical services
- Plus in-depth expertise and support for clients to optimise their asset management
- Testing programmes tailored for individual clients
- Transformer Diagnostics Testing is a key element in effective, condition-based asset management, which can:
  - Establish the present condition of transformers
  - Determine their future performance
  - Identify if current maintenance practices are suitable – or further interventions are required
  - Help evaluate financial and operational risks to the business



# SF<sub>6</sub> Onsite Testing and Sampling Services

SF<sub>6</sub> is becoming more commonly used as an insulation medium in electrical power equipment, due to its unique physical properties. Since SF<sub>6</sub> is a strong greenhouse gas, EA Technology pays special attention to the environmental aspects of the SF<sub>6</sub> technology. In particular our recommended SF<sub>6</sub> handling strategy guarantees an environmentally safe and sound use of SF<sub>6</sub>

## EA Technology can provide gas quality testing, degassing and top-up of SF<sub>6</sub> filled HV equipment including:

- Calibrated pressure tests
- SF<sub>6</sub> Gas purity
- SF<sub>6</sub> Gas dew point
- SF<sub>6</sub> Acidity
- SF<sub>6</sub> Decomposition products
- Breaker gas analysis

All work is carried out by trained and authorised personnel in line with current European regulations.

## Why test SF<sub>6</sub> gas?

- Improve safety
- Minimise environmental impact
- Save maintenance costs
- Improved handling practices
- Early detection of gas breakdown
- Breaker gas analysis



# Oil Diagnostics

## Live Tank Oil Sampling (LTOS) and Analysis

Condition assessment and optimisation of maintenance intervals for oil-filled switchgear.

### Business Benefits

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- Saves money by eliminating wasteful, time-based maintenance

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- Oil condition accurately indicates whether invasive maintenance is required or not

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- Safely extends periods between maintenance interventions

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- Identifies degradation of specific components before they lead to failure

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- Warns of switchgear degradation problems before they lead to failures

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- Increases asset reliability and reduces costs

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- Cost-effective and safe proven method of retrieving an oil sample, causing minimal disruption to the network

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### Features

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- Over-maintaining oil-filled switchgear wastes money, disrupts production and reduces network reliability

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- Optimising maintenance with LTOS cuts costs, minimises disruption and improves reliability

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# LTOS service

## Oil Sampling

- A 50ml sample is taken through a cover plate, tailored to the specific switchgear type and placed over the open, earthed test access of the live asset
- The syringe is sealed, labelled and returned to EA Technology for analysis
- The process is well-proven, safe and causes minimal disruption to the network

## Oil Analysis and Reports

- Laboratory analysis of the degradation curve shows how long oil can be left safely in the equipment before maintenance is required
- The analysis picks up characteristics in the oil which indicate that specific components are on the path to failure
- Clients receive a report on the condition of the asset, together with maintenance recommendations

## Example: 80% Cost Saving

Moving to LTOS from time-based maintenance has reduced the cost of maintaining 500 units by more than 80% per annum for one of our clients. The safety and reliability of their network has also improved, thanks to lower switching requirements and rates of failure.



## Assessing the internal condition of oil-filled transformers

To improve reliability and assist in determining appropriate asset management decisions.

### Business Benefits

- Tests provide an accurate assessment of the internal condition of the transformer
- The condition data in conjunction with other information such as operational duty, transformer history, environment etc. is used to derive a Health Index
- Probability of failure and end-of-life are calculated
- Identifies degradation of specific components before they lead to failure
- Enables operators to develop effective maintenance and replacement strategies based on the condition of the transformer
- Identifies transformers that could benefit from life extension measures
- Low cost test process
- Excellent return on investment



### Did you know?

Creating Health Indices is an essential part of the move towards Condition Based Risk Management™ (CBRM)



## Oil-Filled Transformer Testing and Analysis

EA Technology's extensive experience shows that oil analysis is the most cost-effective way to assess the internal condition of oilfilled transformers. Some of the tests we carry out are as follows:

### Oil Quality

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- Measuring moisture, acidity, solid contamination and breakdown strength of the oil gives a good indication of the overall condition of the oil and internal components. The quality of the oil is also critical in preventing premature ageing of the transformer and extending service life.
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### Furfuraldehyde Analysis

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- Furfuraldehyde analysis gives an accurate indication of the condition of paper insulation. The furfuraldehyde content is correlated to the degree of polymerisation of the paper. When furfuraldehyde levels reach specific values, we know that the insulation has effectively broken down and the probability of failure is very high.
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### Dissolved Gas Analysis (DGA)

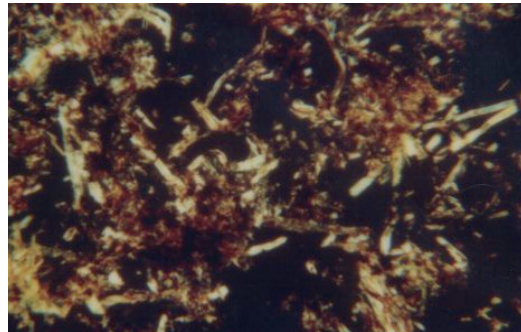
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- Analysing the levels and ratios of different dissolved gases in the oil identifies electrical discharge, arcing and thermal activity within the transformer.
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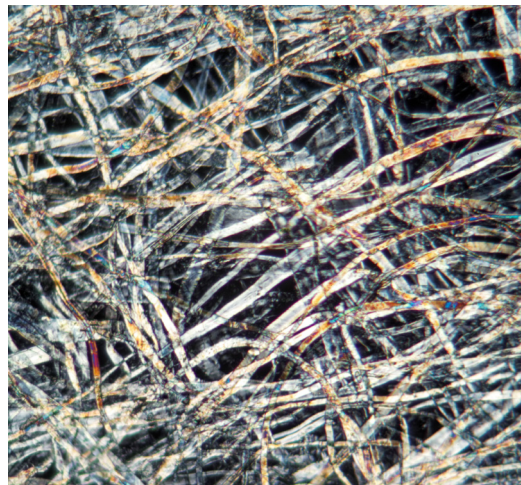
### Oil-filled transformer health indices

The oil analysis provides a very good understanding of the internal condition of a transformer, including the condition of specific components.

The oil analysis results are used in combination with relevant background information to create a Health Index for the asset, expressed as a numerical value on a scale of 1 – 10 from which a Probability of Failure (PoF) and estimated end-of-life are determined. In addition the application of an ageing algorithm enables the future performance and condition to be evaluated. This is particularly valuable for prioritising the maintenance and replacement of multiple assets and is the foundation of CBRM.



*Severely degraded paper insulation, DP200 indicating high probability of transformer failure*



*New paper DP1000*

# **FORENSIC INVESTIGATIONS**

## Failure investigation and prevention

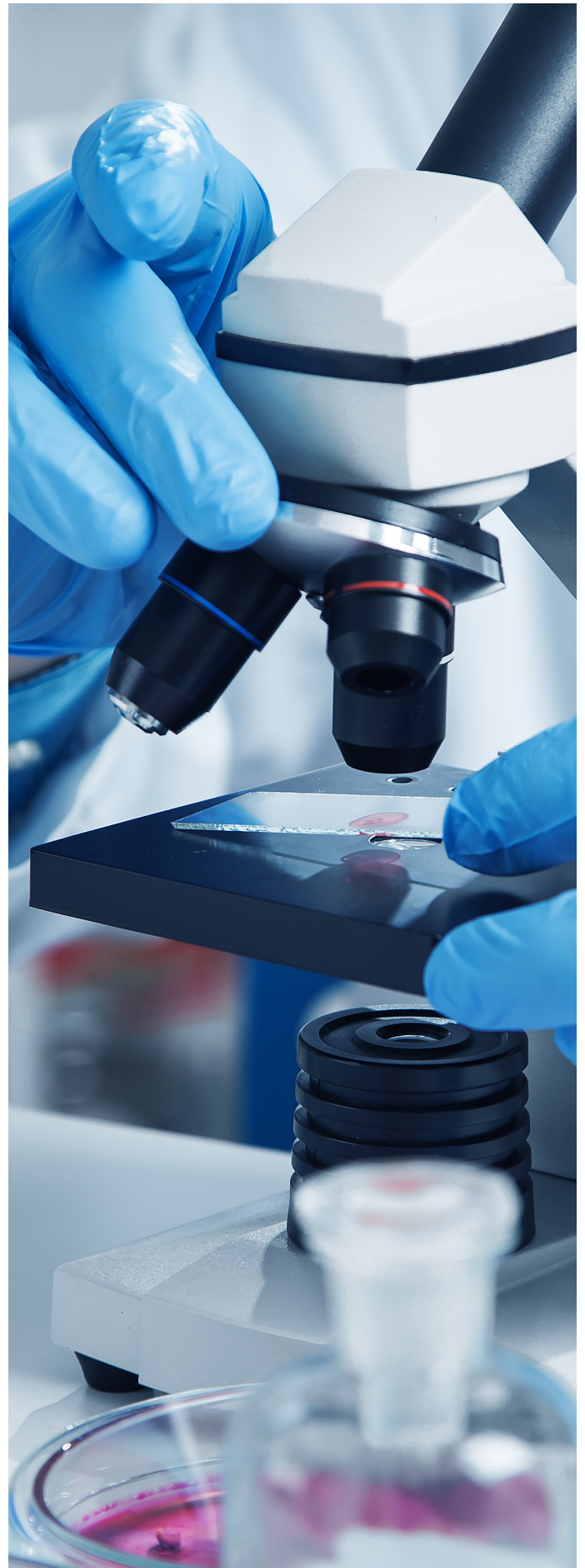
EA Technology has been supplying forensic investigation, failure analysis and materials testing services for more than 40 years. We cover every industry, in any country, from EHV transmission and distribution, to low voltage controls and components.

### The world's leading experts for:

- Forensic investigation of critical assets
- Failure analysis
- Materials testing

### Benefits

- Experienced investigators with multidisciplinary expertise
- On-site incident examination and assessment
- Proven investigation procedures
- Modern analytical techniques
- In-house materials testing capabilities
- Fast, confidential service



## Condition monitoring and asset integrity

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- Prevent future failures, interruption in supply and loss of production

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- Gather expert evidence for issues of legal responsibility, litigation and claims

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- Improve safety, operating procedures, maintenance practices, reliability and design

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- Support asset management decisions in areas including:
  - Reliability predictions
  - Risk analysis
  - Maintenance policies
  - Replacement and investment decisions

## Identifying causes of failure

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- Operator error

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- Lack of maintenance

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- Poor installation

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- Manufacturing defects

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- Deliberate damage or sabotage

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- Environmental factors

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- Service or operational issues

## Analytical services

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- Highly skilled and experienced personnel

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- Scanning electron microscopy, optical microscopy, mechanical testing and materials analysis

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- High voltage experimental and test facilities

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- Oil condition analysis

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- Bespoke experimental projects



For more information on our forensic investigation services visit:

<https://eatechnology.com/services/condition-assessment/failure-investigation>



Scan for more information

# Asset Investment Management

## Condition Based Risk Management

One of the key components in asset management is understanding the condition of your assets, how likely they are to fail and the impact on your business if failure occurs. Condition Based Risk Management is designed to provide asset managers with this information in a clear, consistent and understandable way. Using a methodology that has been developed with electricity network operators for over 20 years, we have created a web-based software solution called Invest that transforms asset data into valuable insights, revolutionising asset management planning and investment decision making.



### Condition Based Risk Management delivers:

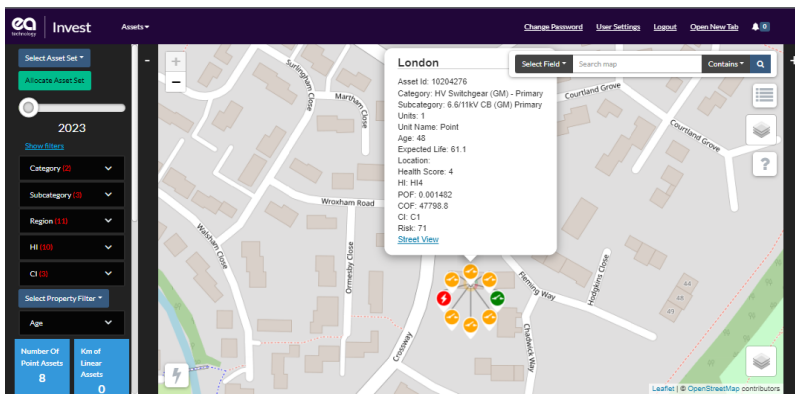
- A significant improvement in the decision-making capability, prioritising investment for maximum return.
- Improved understanding of assets and their health, through adoption of best practice.
- Improved operational performance and management of risk.
- Ability to assess asset data, understand data gaps and improve data quality.
- Key information and easy to understand metrics used to inform and validate your asset management plans.

This well-established process significantly enhances asset management capabilities, capturing engineering expertise and decisions in a clear and objective way.



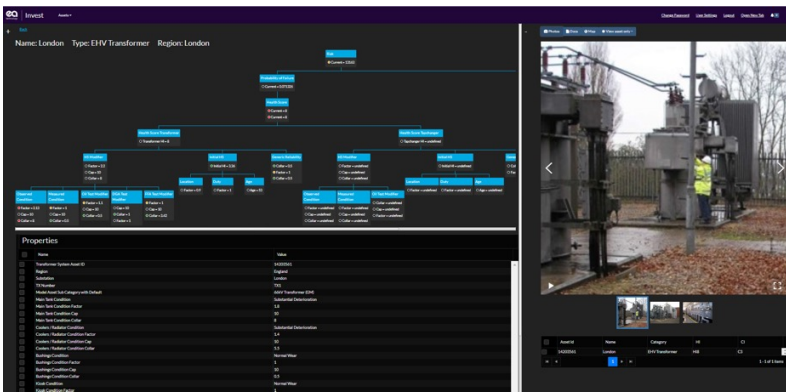
## Invest User Interface

Our third generation web-based Invest software solution delivers enterprise-wide access to asset condition and risks data – consolidated, centralised and digitalised to improve data quality, consistency and accessibility. This graphical, highly intuitive, and configurable user interface allows users to rapidly drill down from map views all the way to component-level supplied data, providing a centralised solution for creating and communicating investment plans:



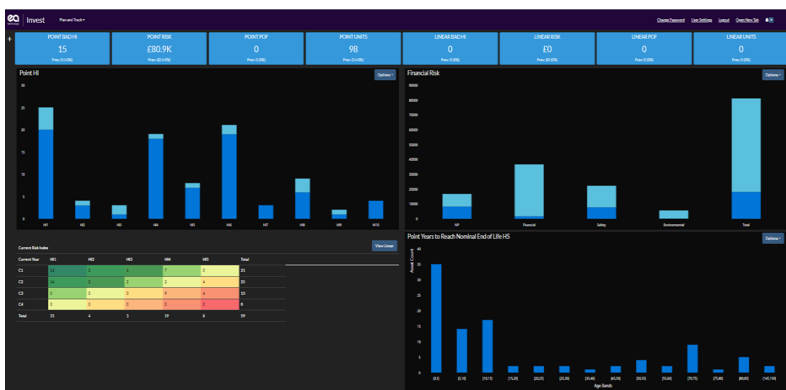
## Map Dashboard

By applying drill-downs, searches and filters, users can instantly access information of most importance, identify worst performing assets and where they are located.



## Methodology Dashboard

Users can access health, probability of failure and risk of failure for each asset, enabling rapid assessment of what is driving these results. At the same time, users can access asset-related images and documents and links to related assets, such as those at the same site.



## Results Dashboard

Users can quickly see an holistic view of their assets, understanding the quantities at each point in the asset health scale, and predicted remnant life.





# INDUSTRIAL FORUM

The Industrial Power Engineers' Forum is an event where you will meet electrical engineers, electrical asset managers and industry experts. Information on HV related failures can be dissected and the understanding of problems, solutions and new products can be discussed and analysed in an open and friendly environment. It will also provide an opportunity to discuss industry practices and strategies with your peers.

Whether you are an experienced engineer looking for opportunities to advance your understanding of the industrial sector or just starting out in the field and seeking advice from more experienced colleagues – this is the forum for you.

The Forum is hosted at EA Technology HQ in Capenhurst.

## Why attend?

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- Get expert advice and learn from your peers.
  - Discuss failures and solutions in an open and friendly environment.
  - Share strategies and practices with your peers.
  - Learn about industry trends and innovations.
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Industrial Forum, Capenhurst, 1st March 2023.

# Lightning Protection Design & Compliance

Our lightning protection experts provide independent advice on the most cost-effective lightning protection systems to guard against damage to your assets from electrical storms. We can undertake an audit of an existing system or assess the risk to new structures.

Our recommendations based on site surveys ensure mandatory compliance with BS EN 62305 and minimise risk to your assets and personnel. It is recommended that existing lightning protection systems are reassessed at intervals of 5-years to ensure that they provide adequate protection for structures and personnel.



The process normally commences with a site survey to understand the scale and purpose of each structure, and the associated activities and occupancy levels. We also consider the presence of existing lightning protection systems.

We then determine the level of protection required for each structure, by undertaking a StrikeRisk assessments incorporating the historic records for lightning activity in the area in accordance with BS EN 62305 standard series. These standards define the risk assessment process and physical protection required for lightning protection to be installed on buildings/structures and surge protection on electrical equipment.

Where lightning protection is deemed a requirement by the process of calculation based on the risk assessment, the level of lightning protection required to gain compliance with the BS EN 62305 will be clearly defined to assist in facilitating subsequent remedial actions.

EA Technology can undertake lightning protection system design which will include the earth electrodes, linking cables and specify the requirements of any surge protection for the service lines. The design of lightning and surge protection will include recommended levels of protection to reduce the risk to an acceptable level.

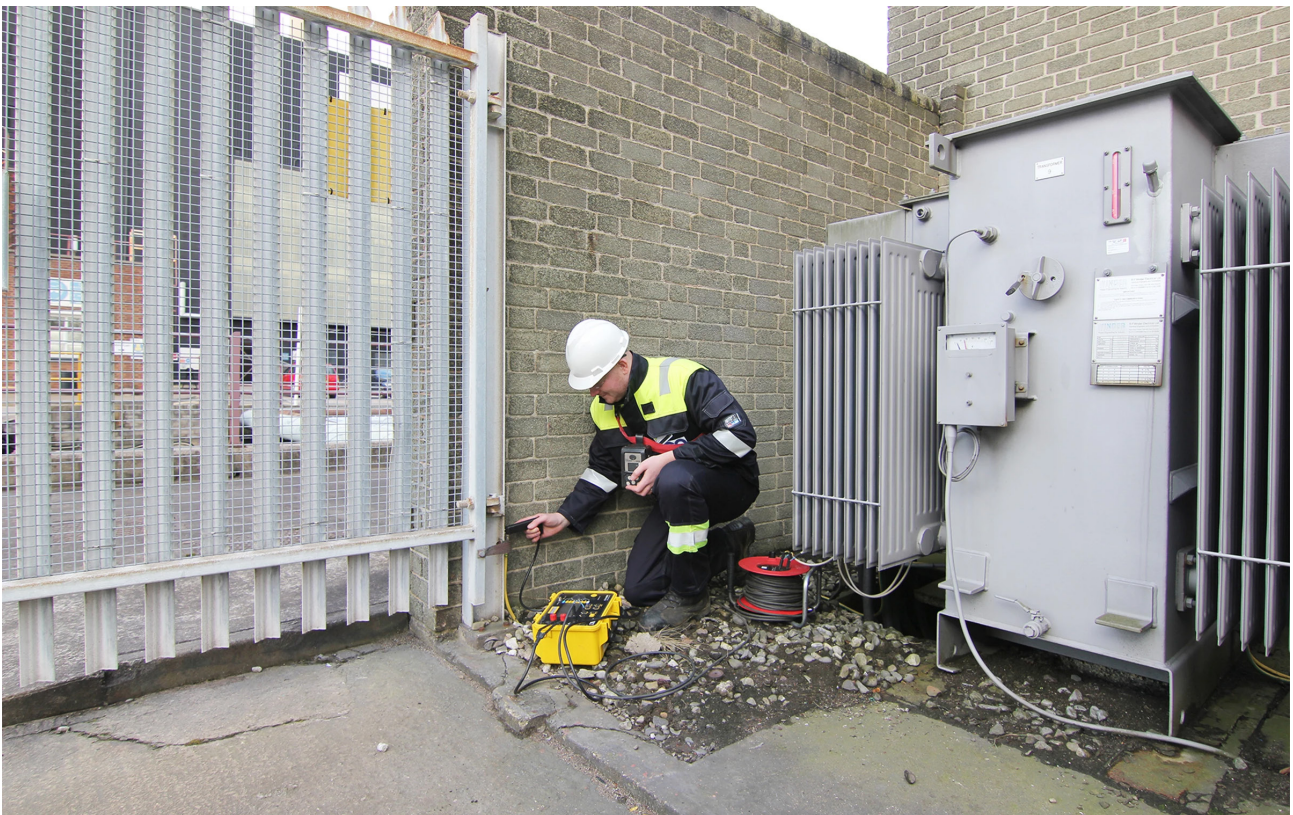


We do not complete installation or remedial works on site as we offer a professional impartial service that is designed to support our clients to manage risk in accordance with relevant standards and protect their people and equipment.

Get in touch to explore how we can assist you.

# Earth System Design & Compliance Audits

The earthing system on your electrical network must ensure that the protection operates correctly and complies with the current safety regulations including BS 7340. It must be installed and maintained to prevent injury to personnel or damage to equipment. We have extensive experience in the design and compliance assessment of earthing systems across all sectors. Depending on your requirements, we can undertake a whole system audit or design earthing systems. Earthing system audits should be completed at 5-year intervals and begin with a visual inspection of the condition of the site ground earthing system.



## We then measure:

- Soil resistivity measurements to assess the impedance of the soil surrounding electrodes to facilitate CDEGS interpreted soil structures, essential for the analysis of the earthing system.
- Continuity measurements to verify the site earthing system connectivity and ensure that low resistance paths are in place throughout the site as a whole.
- Local continuity measurements to confirm effective equipotential platforms.
- Site resistance measurements using the 'Fall of Potential' to facilitate calculation of the sites maximum EPR.
- Touch and Step Potential resistance measurements.

We then model the system in CDEGS based on site survey data to simulate the system's performance under fault conditions. All work will be undertaken in accordance with all relevant standards including BS 7340 and a report incorporating the findings of all assessments, conclusions and recommendations for remedial actions required to achieve compliance with current earthing standards and facilitate tender documentation to complete the work. We do not complete installation or remedial works on site as we offer a professional impartial service that is designed to support our clients to be compliant with relevant standards and protect their people and equipment.



A one day Introduction to Earthing and Lightning Protection Systems course; a three day Substation Earthing course and a two day Lightning Protection for MOD Sites with Explosive Facilities Protection course; and a Lightning Protection, Risk Assessment and Design course: BS EN 6230 course is available [eatechnology.com/training](https://eatechnology.com/training)



Scan for more information



# Training

EA Training is one of the industry's leading providers of High Voltage Electrical Engineering Training, drawing upon over five-decades of technical heritage that EA Technology has to offer. Our specialist expertise builds upon the unique technical capabilities and experience in the sector to develop an extensive range of power engineering courses which are designed to complement the long-term development of current and new staff in their particular profession and specialism. EA Technology's forefront of driving innovation within the industry underpins the practical experience and knowledge in our training provisions, ensuring the optimum balance between theoretical understanding and practical application.

We offer one of the most extensive range of power engineering courses available, all of which are designed and delivered by specialists with expertise in their fields and apply real world lessons and leading-edge knowledge. We help our customers keep up to date with advances in technologies and best practice, and to develop the competencies and skills required in a rapidly changing sector. Our expert led programmes offer structured development routes for a range of power engineering roles and can be customised to meet specific training requirements. We work with customers from around the world delivering training at a range of levels within the workforce, from apprentices to senior engineers, leading employers within the industry, to companies who support these sectors through technology.

Our proposition set can be delivered via face to face, remote or blended learning in the following categories.



## Course Categories

- **Scheduled Courses:** EA Training has one of the most extensive ranges of specialist HV training courses. These open courses are CPD certified and can be taken as standalone courses or in combination to create flexible and individual development routes.
- **Distance Learning:** Our distance learning options allow learners to enhance their chosen career path by enrolling on one of our online programmes or by studying towards a qualification remotely with the assistance from industry tutors.
- **Qualifications:** The EAL (level 3) and City & Guilds (level 2) qualifications are designed for those personnel new to or working within the power industry, they are ideal for those who are wishing to gain knowledge and to prove competence in or progress to a more responsible role.
- **Accredited Programmes:** Our City & Guilds Accredited programmes are a suite of quality assured courses that have been linked together to further enhance the participants workplace competence development within a particular profession and specialism.
- **Managed Programmes:** Our City & Guilds Accredited Managed Programmes are designed to complement the long-term development of the participants through a number of theory and practical based modules, achieving specific competence objectives.
- **Bespoke Training:** In addition to our scheduled course programme, we can also provide onsite training and customised training programmes at locations and dates to suit you.

EA Training has been externally assured as complying with the highest standards in the field. We are a City & Guilds Approved Centre, an EAL Approved Centre, a National Skills Academy for Power Assured Educational and Skills Provider and an accredited member of the Continuing Professional Development Certificate Service.

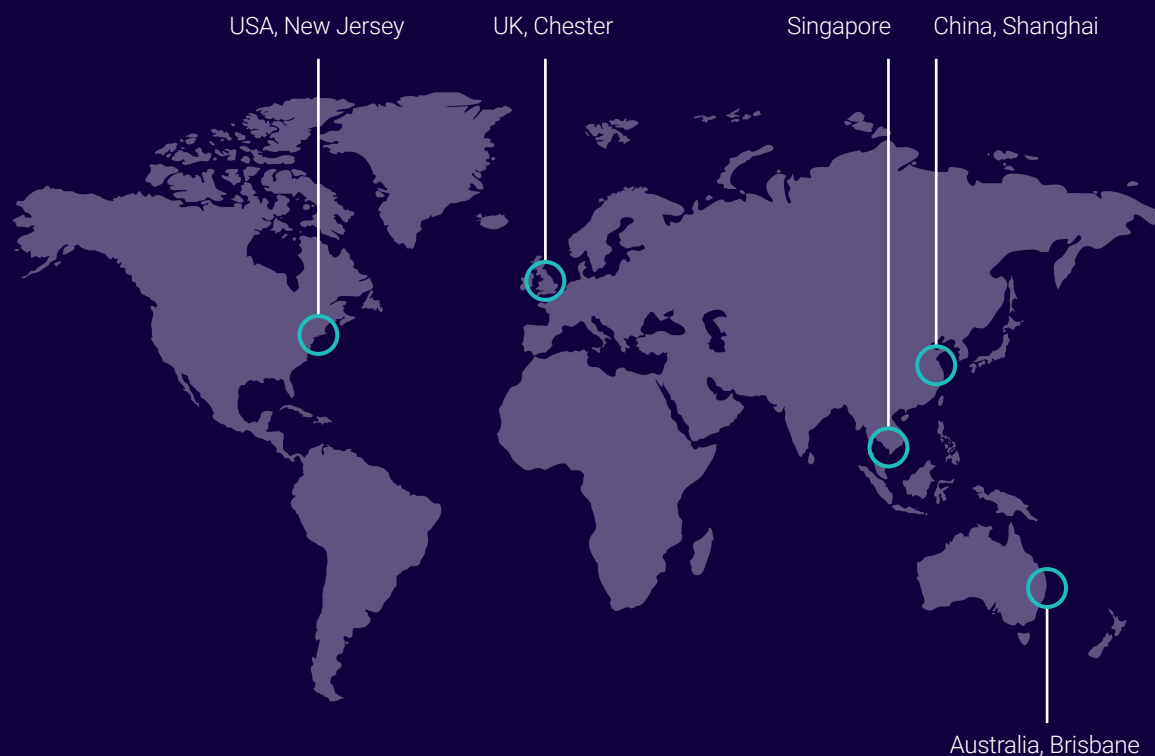
To book a course please visit:

<https://eatechnology.com/training>



# Global Footprint

At EA Technology we specialise in asset management solutions for owners and operators of power network assets.



Founded in 1966 we have over 50 years' experience in the industry and 6 regional offices around the world to support our global customer base.

We work with a lot of our clients on a long-term basis to help them safeguard their power networks.

We advise our clients on strategy and implementation of a range of technology solutions to manage power assets, delivering maximum life and minimise cost.



Safer, Stronger, Smarter Networks

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