DV power

DV SERVICES

Education & Training
Results Analysis
Field testing

# TECHNICAL EDUCATION COURSES

# About us

IBEKO Power AB, with headquarters in Stockholm (Sweden) and best known through the brand “DV Power“, has since 2000 developed radically light and ingenious test solutions for transformers, circuit breakers, and batteries.

DV Power offers a comprehensive range of accredited and qualified technical education services in the fields of theory, diagnostics, management and maintenance practices, testing, data analysis, and results interpretation.

> An investment in knowledge pays the best interest.
>
> *Benjamin Franklin*

# Introduction

Learn from DV Power’s experienced and skillful experts, with significant knowledge in their field of expertise.

Whether you attend classes at our technical learning facility in Stockholm (Sweden), at your company premises bringing our instructors to your facility, or study online using our Webinar e-learning sessions, the maintenance and management training solutions from DV Power cover everything you need to know to keep your key assets running.

Decide what you need and our experts will prepare custom training programs, with DV Power accredited training qualification and certificate.

## Topics

- Power Transformers
- Battery Systems
- On-Load Tap Changers
- Circuit Breakers

## Services are developed for:

- Power utilities
- Transmission companies
- Distribution companies
- Service teams
- Maintenance teams
- Testing companies
- Individuals

## Online Technical Education Course

| Individuals | Companies |
|---|---|
| • 2-day (6 hours total)<br>• One topic<br>• Price on application (POA) | • 3-day (9 hours total)<br>• One topic<br>• Price on application (POA) |

## On-Site Training

| Theory | Theory + Testing |
|---|---|
| • 3 working days<br>• One topic<br>• Price on application (POA) | • 5 working days<br>• One topic<br>• Price on application (POA) |

* The education and training program and its duration is flexible and fully customized.

## Company Training Programs

Dedicated training programs intended for your maintenance teams, to enhance their knowledge and increase overall skills.
DV Power can create custom tailored training programs for you.

## Assessment Quiz

Take the assessment quiz on the DV Power web site to assess your level of knowledge. This path helps you to evaluate your current knowledge about the transformers, circuit breakers and batteries, and to understand the areas of expertise and needed growth.

## Individual Training Programs

Build expertise and qualification in a wide range of subjects. Strengthening your CV, and learning in our group sessions.

# Power Transformer and OLTC Testing

## Transformer testing and condition assessment

- Why do we need it
- How is it performed
- Technical background & useful recommendations
- Practical tips for field testing

## Leakage reactance measurement

- Why do we need it
- How to perform the test
- Results interpretation

## Winding resistance measurement

- Which problems can be detected
- Charging/stabilization time
- How to avoid the wrong measurement
- How to reduce the testing time
- Heat run test
- Results interpretation

## Turns ratio testing

- Ratio measurement and problem analysis
- Innovative method - true three-phase test advantages
- Sequential/simultaneous turns ratio test
- Innovative approach -testing with higher test voltage 500 V - Benefits

# Power Transformer and OLTC Testing

## Power transformer demagnetization

- Why do we need it & the benefits of demagnetization
- How is it performed
- Technical background and useful recommendations

## Excitation current and magnetic balance test

- How to perform the test
- How to analyze the results
- Specific results caused by transformer construction

## Transformer insulation AC measurement

- Power factor/dissipation factor
- Capacitance measurement
- Results interpretation
- How is it performed

## Transformer oil analysis

- Dissolved gas analysis – (DGA)
- On-line gases monitoring
- Importance of the analysis and monitoring
- Results interpretation

## Tap changer principles, designs, and applications

- Different OLTC types
- OLTC construction
- Operation principles

## Tap changer testing methods

- OLTC testing methods – overview
- Innovative DVtest (DRM) method for OLTC testing
- Innovative Vibro-Acoustic Method for OLTC testing

## Sweep frequency response analysis

- How to perform the test
- How to analyze the results
- Specific results caused by transformer failure

# Battery Testing

## Battery theory

- Which types of batteries are used in the industry
- Main advantages/ disadvantages between different types of batteries
- Importance of batteries as back-up power supply systems

## Battery charging

- Different charging modes explained
- What are float and equalizing charge
- Influence of proper charging on battery life

## Capacity test

- Theory of the capacity test
- Importance of the capacity test
- Advantages of the capacity test over other test procedures
- How to perform the capacity test

## Internal resistance test

- Theory of the internal resistance test
- Importance of the internal resistance test
- Advantages of internal resistance test over other test procedures
- How to perform the internal resistance test
- Correlation between internal resistance and battery capacity tests

## Theory of battery testing

- Recommended testing procedures according to IEEE, NERC, and IEC standards
- What are the measurable battery parameters
- How to properly test your battery
- The key test explained

## Battery failure modes

- Indicating parameters
- Thermal Runaway
- Corrosion, Sulphation, Carbonation, and more
- Short-circuits and ground faults/open circuits

# Circuit Breaker Testing

## Introduction

- Essential circuit breaker tests

## Operating mechanism inspections

- Motion and velocity
- Charging time and motor current

## Innovative methods

- Safety ensured with Both sides grounded test on GIS circuit breakers
- Safety ensured with Both sides grounded test on Dead Tank circuit breakers

## Alternative methods

- Online "First trip" test
- Common failure types

## Main contacts inspection

- Timing of main contacts
- Timing and resistance measurement of preinsertion resistor contacts
- Contact static resistance measurement
- Dynamic resistance measurement
- Safety ensured with Both sides grounded test on AIS circuit breakers
- Testing methods for GIS circuit breakers

## Auxiliary circuit inspection

- Timing of auxiliary contacts
- Coil current waveform
- Coil resistance measurement
- Minimum trip voltage
- Minimum operating voltage test
- Supply voltage measurement

# Contact

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