# Advanced Medium-Voltage Switchgear and Circuit Breakers Training Course

4 – 8 July 2027
Marbella

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Training Center

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**Ref:** 933_169802 **Date:** 4 – 8 July 2027 **Location:** Marbella **Fees:** 6500 Euro

## Overview

Advanced Medium-Voltage Switchgear and Circuit Breakers Training Course is a 1-week course for switchgear engineers, maintenance engineers, commissioning specialists, substation engineers, plant electrical teams, and technical managers who need a switchgear condition, test, and lifecycle decision dossier. Participants compare SF6 and vacuum circuit breakers, evaluate metal-enclosed assemblies, interpret ratings and interruption duties, and plan condition-based testing, maintenance, commissioning, and failure response. Applied cases connect evidence to asset decisions. Agile Leaders Training Center provides this advanced switchgear engineering course.

## Who Should Attend

- Professionals responsible for specifying medium-voltage switchgear and circuit-breaker applications.
- Teams responsible for switchgear inspection, maintenance, condition assessment, and outage planning.
- Specialists responsible for commissioning tests, protection interlocks, and acceptance evidence.
- Plant electrical personnel responsible for breaker operation, failure response, and safe restoration.
- Technical managers responsible for asset-life, replacement, and technology-selection decisions.

The course assumes participants already interpret single-line diagrams, equipment nameplates, and electrical test records, and leaves out introductory circuit theory.

## Departments and Industries

The course supports switchgear asset decisions across utility, infrastructure, and industrial environments.

- Substation engineering, commissioning, and maintenance departments
- Power generation and utility distribution operations
- Industrial electrical systems in mining, metals, and process manufacturing
- Data-center, transport, and infrastructure power teams
- Facilities engineering and critical-power maintenance functions

## Learning Objectives

By the end of this course, participants will be able to:

- Analyze switchgear ratings, construction, interruption duty, and internal-arc classifications.
- Compare SF6 and vacuum circuit-breaker operating and insulation principles.
- Apply condition-assessment, test, and commissioning methods.
- Diagnose interlock, insulation, mechanism, and interrupter failures.
- Evaluate maintenance and replacement evidence.
- Build a switchgear lifecycle decision dossier.

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## Course Agenda

### Day 1: Switchgear Architecture and Ratings

- IEC 62271-1 Common Rating and Service-Condition Review
- Single-Line Functional Map and Switchgear Compartment Architecture
- Short-Circuit Making, Breaking, and Withstand Duty Matrix
- Insulation-Level and Dielectric-Clearance Assessment Method
- Protection, Control, and Mechanical Interlock Logic Diagram

### Day 2: Metal-Enclosed Switchgear and Internal Arc

- IEC 62271-200 Metal-Enclosed Switchgear Classification Matrix
- Loss-of-Service-Continuity and Partition-Class Selection Method
- Internal-Arc Classification and Accessibility Review Checklist
- Busbar, Cable, and Withdrawable-Unit Condition Inspection Map
- Partial-Discharge and Insulation-Deterioration Evidence Register

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## Day 3: SF6 and Vacuum Circuit Breaker Technology

- Arc-Interruption Energy and Current-Zero Recovery Model
- SF6 Gas Quality, Density, Leakage, and Handling Control Sheet
- Vacuum Interrupter Contact-Erosion and Integrity Assessment
- Operating-Mechanism Timing and Travel-Trace Interpretation
- IEC 62271-100 Circuit-Breaker Application Decision Matrix

## Day 4: Testing, Maintenance, and Failure Analysis

- Contact-Resistance and Main-Circuit Continuity Test Record
- Insulation-Resistance and Dielectric-Test Evidence Review
- Circuit-Breaker Timing, Coil-Current, and Motion Analysis Plan
- Failure-Mode, Cause, and Corrective-Action Investigation Method
- Condition-Based Maintenance and Asset-Health Index Model

## Day 5: Switchgear Lifecycle Decision Practice

- Suggested Exercise: Switchgear Rating and Duty Verification
- Suggested Exercise: Internal-Arc and Service-Continuity Selection
- Suggested Exercise: SF6 and Vacuum Breaker Condition Diagnosis
- Suggested Exercise: Commissioning Evidence and Failure Review
- Capstone Exercise: Switchgear Condition, Test, and Lifecycle Decision Dossier

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## Practical Exercises

The course uses suggested activities to convert switchgear records into traceable engineering decisions.

- Suggested activity: verify ratings and interruption duties for an industrial medium-voltage board.
- Suggested activity: compare metal-enclosed switchgear classifications for a utility substation scenario.
- Suggested activity: diagnose SF6 and vacuum breaker condition from timing, contact, and insulation evidence.
- Suggested activity: present a lifecycle recommendation with risks, assumptions, and verification actions.

## FAQs

### Who suits Medium-Voltage Switchgear and Circuit Breakers Training and what does it assume?

Practicing switchgear, maintenance, commissioning, substation, and plant electrical professionals suit the course. It assumes experience with single-line diagrams, equipment ratings, and test records, while excluding introductory electrical theory.

### How does Medium-Voltage Switchgear and Circuit Breakers Training differ from a general electrical maintenance course?

Medium-Voltage Switchgear and Circuit Breakers Training focuses on ratings, interruption technology, metal-enclosed assemblies, condition evidence, commissioning, and lifecycle decisions rather than broad plant maintenance routines.

### When should engineers compare SF6 and vacuum circuit breakers?

Engineers compare SF6 and vacuum circuit breakers when interruption duty, insulation design, operating environment, maintenance evidence, handling controls, asset condition, and lifecycle requirements affect technology selection.

### Which tests support medium-voltage switchgear condition decisions?

Medium-voltage switchgear condition decisions use coordinated evidence from visual inspection, contact resistance, insulation condition, breaker timing, coil current, travel traces, gas condition, and vacuum-interrupter assessment.

## How does internal-arc classification affect metal-enclosed switchgear selection?

Internal-arc classification informs accessibility and enclosure-performance decisions, which teams review alongside service continuity, partitioning, installation conditions, operating procedures, and risk controls.

## Conclusion

Participants take back a Switchgear Condition, Test, and Lifecycle Decision Dossier connecting ratings, condition evidence, breaker diagnostics, maintenance, and commissioning records. The dossier improves traceability for continued-service, repair, or replacement decisions. It also identifies risks, assumptions, and verification actions for engineering approval.