



Accredited Africa Training Institute for Capacity Development

Unit FO409, Hatfield Plaza · 1122 Burnett St, Hatfield 0028 · Pretoria, Gauteng · South Africa

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COURSE BROCHURE

Medium Voltage Radial Network Operation Training

Physical Planning and Construction / Electrical Infrastructure Construction

Unit Standard 113900 · NQF Level 4 · 20 Credits · 17 Days

COURSE OVERVIEW

This course equips learners with the knowledge and skills to safely and efficiently operate medium voltage radial networks. Participants will understand network configurations, switching procedures, and fault management to ensure system reliability and compliance with South African standards.

Category	Physical Planning and Construction
Subfield	Electrical Infrastructure Construction
Unit Standard	113900
Accreditation	SAQA Accredited · NQF Level 4 · 20 Credits
Duration	17 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply switching procedures for medium voltage radial networks in accordance with safety protocols.
- Analyze network configurations to identify load flow and fault conditions.
- Demonstrate proper use of personal protective equipment and safety devices during network operations.
- Evaluate fault scenarios and implement corrective actions to restore supply.
- Implement isolation and earthing procedures to ensure safe working conditions.
- Interpret single-line diagrams and network schematics for operational decision-making.

WHO SHOULD ATTEND

- This training is designed for electrical technicians, engineers, and operators involved in the operation and maintenance of medium voltage distribution networks in industrial and utility settings.

COURSE OUTLINE

Day 1: Introduction to Medium Voltage Systems

- Overview of MV systems (1 kV – 33 kV).
- Radial network configuration and applications.
- Key components: transformers, switchgear, cables, and isolators.
- Basic electrical theory: voltage, current, power.
- Safety standards: SANS 10092, OHS Act.
- Introduction to network protection principles.

Day 2: MV Switchgear and Control Equipment

- Air-insulated and gas-insulated switchgear.
- Circuit breakers: SF6, vacuum, oil.
- Disconnectors and earthing switches.
- Control panels and mimic diagrams.
- Interlocking systems for safety.
- Routine inspection and testing of switchgear.

Day 3: MV Cables and Accessories

- Paper-insulated, XLPE, and EPR cables.
- Cable ratings and ampacity.
- Termination kits and joints.
- Cable fault types: open, short, earth.
- Fault location techniques: TDR, bridge methods.
- Cable installation and route planning.

Day 4: Transformers in MV Networks

- Distribution transformers: pole-mounted, pad-mounted.
- Winding configurations: delta, star.
- Vector groups and phase displacement.
- Transformer protection: Buchholz, overcurrent, earth fault.
- Oil testing and insulation resistance.
- Tap changers and voltage regulation.

Day 5: Protection Systems and Relays

- Overcurrent and earth fault protection.
- Directional and differential protection.
- Relay types: electromechanical, solid-state, numerical.
- Time-current characteristics and grading.
- CT and VT connections for protection.
- Protection coordination studies.

Day 6: Network Operating Procedures

- Switching schedules and sequences.
- Isolation and earthing procedures.
- Permit-to-work and safety documentation.
- Lockout/tagout (LOTO) practices.
- Emergency shutdown procedures.

- Communication protocols during operations.

Day 7: Fault Diagnosis and Troubleshooting

- Fault types: short circuit, overload, earth fault.
- Diagnostic tools: insulation testers, multimeters, thermal imaging.
- Fault indicators and remote monitoring.
- Systematic troubleshooting approach.
- Analyzing SCADA alarms.
- Case studies of network faults.

Day 8: Switching and Operational Safety

- OHS Act and relevant regulations.
- Arc flash hazards and mitigation.
- PPE requirements: gloves, helmets, flash suits.
- Risk assessment methodologies.
- Safe approach distances.
- Emergency response for electrical incidents.

Day 9: Maintenance Strategies for MV Equipment

- Preventive maintenance: cleaning, tightening, lubrication.
- Predictive maintenance: thermography, oil analysis, partial discharge.
- Maintenance planning and scheduling.
- Record keeping and documentation.
- Condition monitoring techniques.
- Corrective maintenance procedures.

Day 10: Network Configuration and Load Management

- Radial vs. ring networks.
- Load flow analysis basics.
- Voltage drop calculations.
- Power factor correction.
- Load shedding and demand side management.
- Network reconfiguration for efficiency.

Day 11: SCADA and Remote Monitoring

- SCADA architecture: RTU, PLC, HMI.
- Communication protocols: DNP3, IEC 61850.
- Remote terminal units (RTUs) and sensors.
- Data acquisition and alarm management.
- Historical data analysis.
- Cybersecurity basics for SCADA.

Day 12: Regulatory Compliance and Standards

- SANS standards for MV equipment.
- NERSA grid code requirements.
- Environmental compliance.
- Quality management systems (ISO 9001).
- Audit preparation and record keeping.
- Incident reporting and investigation.

Day 13: Emergency Response and Contingency Planning

- Emergency response team roles.
- Outage management systems.
- Contingency plans for equipment failure.
- Communication with customers and authorities.
- Restoration procedures.
- Post-incident analysis and improvement.

Day 14: Advanced Protection Schemes

- Differential protection for transformers and lines.
- Distance protection principles.
- Numerical relay programming.
- Protection coordination software.
- Auto-reclosing and sectionalizing.
- Case studies of protection failures.

Day 15: Power Quality and Harmonics

- Power quality parameters: voltage, frequency, flicker.
- Harmonic sources and effects.
- Harmonic measurement instruments.
- Passive and active filters.
- Power quality standards (NRS 048).
- Mitigation techniques.

Day 16: Asset Management and Lifecycle Planning

- Asset management frameworks (ISO 55000).
- Lifecycle costing.
- Risk assessment for asset decisions.
- Condition assessment techniques.
- Asset management systems (CMMS).
- Replacement and refurbishment strategies.

Day 17: Integration and Capstone Review

- Comprehensive case study.
- Simulated switching operation.
- Troubleshooting exercise.
- Assessment preparation.
- Q&A; session.
- Course evaluation and feedback.

ASSESSMENT & CERTIFICATION

Delegates are assessed through exercises and a final test. A mark of **50% or above** earns an **AATICD Certificate of Completion**, issued digitally with a unique verification code. This course carries **20 NQF credits** at **NQF Level 4**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 53,800.00	R 53,800.00
1	In-House	R 69,900.00	R 69,900.00
1	On-Campus (Pretoria)	R 80,700.00	R 80,700.00

UPCOMING SESSIONS

Start	End	Method	Venue
06 Aug 2026	28 Aug 2026	On-Campus	Pretoria, South Africa
06 Aug 2026	28 Aug 2026	On-Campus	Lagos, Nigeria
07 Aug 2026	31 Aug 2026	On-Campus	Johannesburg, South Africa
10 Aug 2026	01 Sep 2026	On-Campus	Cape Town, South Africa
11 Aug 2026	02 Sep 2026	On-Campus	Dubai, UAE
12 Aug 2026	03 Sep 2026	On-Campus	Pretoria, South Africa
13 Aug 2026	04 Sep 2026	On-Campus	Abu Dhabi, UAE
14 Aug 2026	07 Sep 2026	On-Campus	Mauritius

Contact us if no suitable date is listed – on-demand sessions can be arranged for groups.

HOW TO GET A QUOTE OR APPLY

- 1. Get an instant quotation online:** visit www.aaticd.co.za, open the page for this course (Unit Standard 113900) and click **Get A Quote / Apply**. Select your training method and number of delegates – your quotation is generated immediately and emailed to you with the course brochure attached.
- 2. Apply by email:** send the course title, your preferred training method (Online, In-House or On-Campus Pretoria), the number of delegates and your preferred dates to apply@aaticd.co.za – our team will reply with a formal quotation.
- 3. Apply by phone or WhatsApp:** call +27 12 004 8389 or WhatsApp +27 65 077 6310 and we will prepare your quotation and reserve your seats.
- 4. Confirm your booking:** accept the quotation and settle the invoice. As soon as payment is confirmed your delegates are enrolled and receive their AATICD LMS login details by email, along with joining instructions for their chosen training method.

Group discounts apply automatically – the more delegates you enrol, the lower the price per delegate. No payment is required to request a quotation.

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