



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

Perform Bonding And Earthing On 3 Kv Dc And 25 50kv Ac On Ohte Training

Physical Planning and Construction / Electrical Infrastructure Construction

Unit Standard 119886 · NQF Level 2 · 15 Credits · 12 Days

COURSE OVERVIEW

This course equips learners with the knowledge and practical skills to safely perform bonding and earthing procedures on 3 kV DC and 25/50 kV AC overhead traction equipment (Ohte) in the rail environment. It ensures compliance with South African safety standards and reduces risk of electrical shock or arc flash incidents.

Category	Physical Planning and Construction
Subfield	Electrical Infrastructure Construction
Unit Standard	119886
Accreditation	SAQA Accredited · NQF Level 2 · 15 Credits
Duration	12 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply correct bonding and earthing techniques on 3 kV DC and 25/50 kV AC Ohte in accordance with safety regulations.
- Identify and evaluate potential electrical hazards associated with bonding and earthing tasks.
- Demonstrate the use of appropriate personal protective equipment (PPE) and safety tools.
- Implement isolation and earthing procedures to ensure a safe working environment.
- Analyze system diagrams and schematics to determine bonding and earthing requirements.
- Perform post-work testing and verification of bonding and earthing integrity.

WHO SHOULD ATTEND

- This course is designed for electrical technicians, linesmen, and maintenance personnel working on railway overhead traction systems who require formal training in bonding and earthing procedures.

COURSE OUTLINE

Day 1: Introduction to Bonding and Earthing Principles

- Overview of OHTE systems: 3kV DC and 25/50kV AC.
- Basic electrical theory: voltage, current, resistance, and earth path.
- Difference between bonding and earthing.
- Relevant SAQA unit standards and legislative requirements.
- Safety precautions and risk assessment principles.
- Introduction to earth electrodes and earthing conductors.
- Case studies of earthing failures.

Day 2: Earth Electrode Systems and Soil Resistivity

- Factors affecting soil resistivity: moisture, temperature, chemical content.
- Earth electrode configurations: rod, plate, ring, and grid.
- Step-by-step soil resistivity testing procedure.
- Calculation of earth resistance using formulae.
- Practical exercise: soil resistivity measurement.
- Recording and reporting test results.

Day 3: Earthing Conductor Sizing and Installation

- Sizing criteria: fault current, duration, and thermal capacity.
- Material properties and corrosion considerations.
- Installation techniques: trenching, clamping, and bonding.
- Connection methods: exothermic welding, mechanical clamps, compression.
- Continuity testing using a low-resistance ohmmeter.
- Common installation defects and remedies.

Day 4: Bonding of Metallic Structures and Equipment

- Bonding of rails, overhead line towers, and supporting structures.
- Equipotential bonding to prevent step and touch potentials.
- Bonding of switchgear, transformers, and surge arrestors.
- Bonding of cable sheaths and armouring.
- Use of bonding jumpers and flexible connectors.
- Testing bond resistance and continuity.

Day 5: Earthing of 3kV DC Traction Systems

- DC traction system overview: substations, overhead line, return path.
- Stray current corrosion: causes and effects.
- Stray current collection systems and drainage bonds.
- Earthing of DC switchgear and rectifiers.
- Measurement of rail-to-earth potentials.
- Maintenance of DC earthing systems.

Day 6: Earthing of 25/50kV AC Traction Systems

- AC traction system overview: feeding, return, and earthing.
- Earth wires on overhead lines: lightning protection and fault return.
- Earthing of autotransformers and booster transformers.
- Touch and step potential calculations and limits.

- Measurement of earth grid resistance.
- Safety clearances and isolation procedures.

Day 7: Lightning Protection and Surge Arrestors

- Lightning strike mechanisms and risk assessment.
- Lightning protection zones and rolling sphere method.
- Surge arrestor types: metal oxide, gapped, and hybrid.
- Installation location and lead length optimisation.
- Bonding of arrestors to earth electrode.
- Periodic testing and maintenance of arrestors.

Day 8: Testing and Commissioning of Earthing Systems

- Earth resistance test equipment: clamp-on meter, 3-point tester.
- Fall-of-potential test procedure and interpretation.
- Touch and step potential measurement setup.
- Continuity testing of bonds and conductors.
- Acceptance criteria per SANS and utility standards.
- Commissioning reports and documentation.

Day 9: Maintenance and Inspection of Bonding and Earthing

- Maintenance planning: frequency and scope.
- Corrosion types: galvanic, electrolytic, and environmental.
- Inspection of connections, conductors, and electrodes.
- Testing intervals and record keeping.
- Repair techniques: replacement, re-welding, adding electrodes.
- Safety during maintenance activities.

Day 10: Fault Analysis and Earth Fault Protection

- Earth fault types: solid, resistive, and intermittent.
- Earth fault current paths and return circuits.
- Protection relays: directional, overcurrent, and sensitive earth fault.
- Setting coordination with earthing impedance.
- Fault recording and analysis tools.
- Case studies of earth fault incidents.

Day 11: Advanced Applications and Emerging Technologies

- Earthing in multi-system traction (DC+AC).
- Gradient control wires for step potential reduction.
- Earthing of solar/wind farms feeding traction.
- Remote monitoring of earth resistance and leakage.
- Use of conductive concrete and alternative electrodes.
- Regulatory updates and future trends.

Day 12: Practical Integration and Assessment

- Practical exercise: design and install earthing for a simulated OHTE section.
- Conduct all tests: earth resistance, continuity, touch/step potential.
- Troubleshoot and rectify faults.
- Compile and present test report.
- Written assessment covering theory and standards.

- Feedback and certification guidance.

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 **15 NQF credits** at **NQF Level 2**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 41,000.00	R 41,000.00
1	In-House	R 53,300.00	R 53,300.00
1	On-Campus (Pretoria)	R 61,500.00	R 61,500.00

UPCOMING SESSIONS

Start	End	Method	Venue
07 Aug 2026	24 Aug 2026	On-Campus	Cape Town, South Africa
10 Aug 2026	25 Aug 2026	On-Campus	Pretoria, South Africa
11 Aug 2026	26 Aug 2026	On-Campus	Abu Dhabi, UAE
12 Aug 2026	27 Aug 2026	On-Campus	Durban, South Africa
12 Aug 2026	27 Aug 2026	On-Campus	Mauritius
13 Aug 2026	28 Aug 2026	On-Campus	Cape Town, South Africa
14 Aug 2026	31 Aug 2026	On-Campus	Dubai, UAE
17 Aug 2026	01 Sep 2026	On-Campus	Abu Dhabi, UAE

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 119886) 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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