



Accredited Africa Training Institute for Capacity Development

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

Tel: +27 12 004 8389 · Mobile: +27 65 077 6310

Email: apply@aaticd.co.za · Website: www.aaticd.co.za

COURSE BROCHURE

Coal Boiler Steam Generation Operation Training

Manufacturing, Engineering and Technology / Fabrication and Extraction

Unit Standard 110420 · NQF Level 4 · 18 Credits · 15 Days

COURSE OVERVIEW

This course equips learners with the knowledge and skills required to operate coal boiler steam generation systems safely and efficiently. It focuses on start-up, shutdown, monitoring, and troubleshooting procedures to ensure optimal performance and compliance with industry standards.

Category	Manufacturing, Engineering and Technology
Subfield	Fabrication and Extraction
Unit Standard	110420
Accreditation	SAQA Accredited · NQF Level 4 · 18 Credits
Duration	15 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Demonstrate the correct procedures for starting up and shutting down a coal boiler steam generation system.
- Apply safety protocols and emergency response measures during boiler operations.
- Monitor and control boiler parameters such as pressure, temperature, and water level to maintain efficient steam generation.
- Analyze common operational problems and implement corrective actions to prevent system failures.
- Evaluate the impact of coal quality and combustion conditions on boiler performance and emissions.
- Implement routine maintenance and inspection tasks to ensure boiler reliability and longevity.

WHO SHOULD ATTEND

- This course is designed for boiler operators, plant engineers, maintenance technicians, and anyone responsible for the operation or supervision of coal-fired steam generation systems in industrial or power generation settings.

COURSE OUTLINE

Day 1: Introduction to Coal Boiler Steam Generation

- Overview of steam generation in industry
- Types of coal boilers (pulverized fuel, fluidized bed, stoker)
- Basic thermodynamics: heat, temperature, pressure
- Combustion fundamentals: fuel, air, ignition
- Boiler components: furnace, tubes, drums, superheaters
- Safety: PPE, emergency shutdown, lockout/tagout

Day 2: Coal Properties and Fuel Handling

- Coal analysis: proximate, ultimate, calorific value
- Coal rank and classification
- Coal handling systems: conveyors, crushers, pulverizers
- Storage: stockpile management, dust control
- Feeding mechanisms: stokers, burners
- Fuel blending and quality control

Day 3: Combustion Theory and Air Management

- Combustion chemistry: carbon, hydrogen, sulfur
- Stoichiometric air requirements
- Excess air: optimal range, efficiency impact
- Draft systems: natural, forced, induced
- Air preheaters and their function
- Flue gas analysis: O₂, CO, CO₂

Day 4: Boiler Water Chemistry and Treatment

- Feedwater impurities: hardness, silica, dissolved gases
- External treatment: softening, demineralization, reverse osmosis
- Internal treatment: phosphates, amines, oxygen scavengers
- Blowdown: intermittent, continuous
- Corrosion mechanisms and prevention
- Sampling and testing procedures

Day 5: Boiler Operation: Startup, Normal Running, Shutdown

- Pre-start checks: water level, fuel supply, air dampers
- Startup sequence: purge, ignition, warm-up, pressurization
- Normal operation: load management, drum level control
- Shutdown procedures: load reduction, cooling, isolation
- Layup: wet vs dry, nitrogen blanketing
- Emergency shutdown: reasons and actions

Day 6: Boiler Control Systems and Instrumentation

- Control loops: combustion, feedwater, steam temperature
- Sensors: pressure, temperature, flow, level
- Actuators: dampers, valves, drives
- DCS overview: HMI, setpoints, trends
- Safety interlocks: low water cutoff, high pressure

- Alarm management and troubleshooting

Day 7: Steam Turbine Integration and Cogeneration

- Steam turbine types: backpressure, condensing, extraction
- Rankine cycle and efficiency
- Cogeneration: combined heat and power (CHP)
- Steam quality: dryness fraction, superheat
- Condenser operation and vacuum maintenance
- Load matching and optimization

Day 8: Boiler Efficiency and Performance Monitoring

- Direct method: input-output efficiency
- Indirect method: heat loss analysis
- Key losses: dry flue gas, moisture, unburned carbon
- Performance indicators: efficiency, specific fuel consumption
- Excess air optimization
- Heat balance exercise

Day 9: Emissions Control and Environmental Compliance

- Pollutants: SO_x, NO_x, particulate matter, CO₂
- Control technologies: scrubbers, ESP, baghouses, SCR
- Continuous emission monitoring systems (CEMS)
- Regulatory framework: NEM:AQA, minimum emission standards
- Ash handling and disposal
- Carbon capture and storage (CCS) overview

Day 10: Maintenance and Inspection of Boilers

- Maintenance schedules: daily, weekly, annual
- Inspection: visual, NDT (ultrasonic, radiography)
- Common failures: tube leaks, creep, corrosion fatigue
- Refractory and insulation inspection
- Valve and pump maintenance
- Condition monitoring: vibration, thermography

Day 11: Safety, Risk Assessment, and Permit to Work

- Hazard identification: HAZOP, JSA
- Risk matrix and control measures
- Permit to work: types, authorization, isolation
- Confined space entry procedures
- Hot work: welding, grinding, fire watch
- Emergency response: fire, explosion, chemical release

Day 12: Troubleshooting and Problem Solving

- Problem: low steam pressure, high flue gas temperature
- Root cause analysis: fishbone, 5 whys
- Using trends and logs for diagnosis
- Common issues: slagging, fouling, tube leaks
- Corrective actions: sootblowing, load changes
- Case studies and group exercises

Day 13: Advanced Topics: Supercritical Boilers and Fluidized Bed

- Supercritical cycle: once-through boiler
- CFB: principle, advantages, fuel flexibility
- Comparison: PC vs CFB vs stoker
- Advanced materials: creep-resistant alloys
- Low NOx burners and staged combustion
- Future trends: biomass co-firing, oxy-fuel

Day 14: Practical Application and Simulation Exercises

- Simulator training: startup sequence
- Emergency scenarios: tube rupture, flame failure
- Efficiency calculation exercise
- Control loop tuning simulation
- Team-based problem-solving
- Reflection and feedback

Day 15: Assessment and Course Review

- Written assessment: multiple choice, short answer
- Practical assessment: simulated operations
- Course review: Q&A; session
- Feedback on performance
- Certification and next steps
- Course evaluation

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 **18 NQF credits** at **NQF Level 4**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 48,600.00	R 48,600.00
1	In-House	R 63,200.00	R 63,200.00
1	On-Campus (Pretoria)	R 72,900.00	R 72,900.00

UPCOMING SESSIONS

Start	End	Method	Venue
03 Aug 2026	21 Aug 2026	On-Campus	Johannesburg, South Africa
04 Aug 2026	24 Aug 2026	On-Campus	Mauritius
05 Aug 2026	25 Aug 2026	On-Campus	Cape Town, South Africa
06 Aug 2026	26 Aug 2026	On-Campus	Dubai, UAE
07 Aug 2026	27 Aug 2026	On-Campus	Pretoria, South Africa
07 Aug 2026	27 Aug 2026	On-Campus	Lagos, Nigeria
10 Aug 2026	28 Aug 2026	On-Campus	Durban, South Africa
10 Aug 2026	28 Aug 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 110420) 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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