



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

Chlorine Dioxide Generation For Pulp Bleaching Training

Manufacturing, Engineering and Technology / Manufacturing and Assembly

Unit Standard 114244 · NQF Level 3 · 30 Credits · 27 Days

COURSE OVERVIEW

This course equips learners with the knowledge and skills to generate chlorine dioxide safely and efficiently for pulp bleaching in the pulp and paper industry. It covers the principles of chlorine dioxide chemistry, generation processes, and safety protocols to ensure compliance with industry standards.

Category	Manufacturing, Engineering and Technology
Subfield	Manufacturing and Assembly
Unit Standard	114244
Accreditation	SAQA Accredited · NQF Level 3 · 30 Credits
Duration	27 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply the principles of chlorine dioxide chemistry to optimize generation processes.
- Analyze the operational parameters of chlorine dioxide generators to ensure efficient and safe production.
- Evaluate the quality of chlorine dioxide produced against industry specifications.
- Implement safety procedures and emergency response protocols for chlorine dioxide handling.
- Demonstrate the ability to troubleshoot common issues in chlorine dioxide generation systems.
- Design a basic chlorine dioxide generation process flow diagram with key control points.

WHO SHOULD ATTEND

- This course is designed for process operators, technicians, and production supervisors in the pulp and paper industry who are involved in or responsible for chlorine dioxide generation and bleaching operations.

COURSE OUTLINE

Day 1: Introduction to Pulp Bleaching and Chlorine Dioxide

- Overview of pulp and paper manufacturing
- Bleaching stages and sequences (e.g., ECF, TCF)
- Properties of chlorine dioxide vs. chlorine
- Safety and environmental advantages
- Key reactions: ClO_2 generation from sodium chlorate

Day 2: Chemistry of Chlorine Dioxide Generation

- Sodium chlorate reduction with sulfur dioxide or methanol
- Reaction mechanisms and kinetics
- Acidic conditions and pH control
- By-products: sodium sulfate, chlorine
- Material balance calculations

Day 3: Generation Technologies Overview

- Mathieson process (SO_2 reduction)
- R2, R3, R8, R10 processes (methanol-based)
- SVP-Lite and SVP-HP technologies
- Integrated vs. standalone generators
- Process comparison matrix

Day 4: Process Equipment and Instrumentation

- Reactor design and materials (titanium, FRP)
- Absorption towers and gas-liquid contact
- Scrubbers for off-gas treatment
- Pumps, valves, and piping
- Sensors: pH, temperature, pressure, flow

Day 5: Process Control and Automation

- Feedback and feedforward control
- PID tuning for reactors
- Alarms and shutdown logic
- Data logging and trend analysis
- Human-machine interface (HMI) design

Day 6: Raw Materials Handling and Storage

- Sodium chlorate: properties, storage, dissolution
- Sulfuric acid: dilution, corrosion control
- Methanol: flammability, ventilation
- Chemical unloading procedures
- Spill containment and emergency response

Day 7: Safety in Chlorine Dioxide Generation

- ClO_2 properties: yellow gas, explosive limits
- Exposure limits and monitoring
- PPE: SCBA, chemical suits
- Confined space entry procedures

- Emergency shutdown and evacuation plans

Day 8: Quality Control and Analytical Methods

- Sampling points and frequency
- Iodometric titration for ClO₂ concentration
- Chlorine and chlorate analysis
- pH and conductivity measurement
- Quality records and reporting

Day 9: Environmental Management and Compliance

- AOX (adsorbable organic halides) regulations
- Effluent treatment: neutralization, biological
- Air emissions: chlorine, ClO₂ scrubbing
- Solid waste: sodium sulfate recovery
- Environmental impact assessments

Day 10: Maintenance of Generation Equipment

- Maintenance planning and scheduling
- Inspection of titanium and FRP components
- Gasket and seal replacement
- Cleaning of scrubbers and packing
- Spare parts management

Day 11: Troubleshooting and Problem Solving

- Low ClO₂ yield: causes and fixes
- High chlorine residual: adjustment
- Foaming and scaling in absorbers
- Instrument drift and recalibration
- Case studies of real incidents

Day 12: Integration with Bleaching Plant

- Bleach plant process overview
- ClO₂ addition points: D0, D1, D2 stages
- Consistency and temperature control
- Brightness and viscosity targets
- Chemical cost optimization

Day 13: Efficiency and Yield Optimisation

- Efficiency calculations: yield, selectivity
- Reducing sodium chlorate consumption
- Heat integration and energy recovery
- Statistical process control (SPC)
- Best practices from mills

Day 14: Advanced Topics: New Technologies

- Electrochemical generation methods
- Membrane cell technology
- On-demand generation systems
- Integration with biorefineries
- Future of ECF bleaching

Day 15: Process Simulation and Modeling

- Introduction to process simulators (e.g., Aspen)
- Building a ClO₂ generation model
- Sensitivity analysis
- Dynamic simulation for startups
- Model-based optimization

Day 16: Health and Safety Management Systems

- Safety management system elements
- Hazard identification and risk assessment (HIRA)
- Permit to work systems
- Incident investigation and reporting
- Safety training and competency

Day 17: Regulatory Compliance and Standards

- Unit standard outcomes and assessment criteria
- National Environmental Management Act
- Occupational Health and Safety Act
- SANS 10228: Chlorine dioxide safety
- Audit preparation and record keeping

Day 18: Plant Start-up and Shutdown Procedures

- Pre-startup safety reviews (PSSR)
- Step-by-step start-up sequence
- Normal shutdown: draining, purging
- Emergency shutdown triggers
- Preservation of equipment during outages

Day 19: Operator Training and Competency Assessment

- Training needs analysis
- On-the-job training methods
- Simulator-based training
- Competency assessment tools
- Performance evaluation

Day 20: Course Review and Final Assessment

- Review of key concepts
- Written examination
- Practical assessment (simulated or real)
- Feedback session
- Certification and next steps

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 **30 NQF credits** at **NQF Level 3**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 79,400.00	R 79,400.00
1	In-House	R 103,200.00	R 103,200.00
1	On-Campus (Pretoria)	R 119,100.00	R 119,100.00

UPCOMING SESSIONS

Start	End	Method	Venue
04 Aug 2026	09 Sep 2026	On-Campus	Johannesburg, South Africa
05 Aug 2026	10 Sep 2026	On-Campus	Mauritius
06 Aug 2026	11 Sep 2026	On-Campus	Cape Town, South Africa
07 Aug 2026	14 Sep 2026	On-Campus	Dubai, UAE
10 Aug 2026	15 Sep 2026	On-Campus	Abu Dhabi, UAE
11 Aug 2026	16 Sep 2026	On-Campus	Durban, South Africa
11 Aug 2026	16 Sep 2026	On-Campus	Mauritius
12 Aug 2026	17 Sep 2026	On-Campus	Cape Town, South Africa

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 114244) 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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