



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

Chemical Pulp Production Using Vertical Continuous Digesters Training

Manufacturing, Engineering and Technology / Manufacturing and Assembly

Unit Standard 114252 · NQF Level 4 · 34 Credits · 31 Days

COURSE OVERVIEW

This course equips learners with the knowledge and skills to operate vertical continuous digesters for chemical pulp production in the pulp and paper industry. It covers the principles of continuous cooking, process control, and safety procedures to ensure efficient and high-quality pulp production.

Category	Manufacturing, Engineering and Technology
Subfield	Manufacturing and Assembly
Unit Standard	114252
Accreditation	SAQA Accredited · NQF Level 4 · 34 Credits
Duration	31 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply the principles of continuous cooking to optimize pulp yield and quality.
- Demonstrate safe start-up, operation, and shutdown procedures for vertical continuous digesters.
- Analyze process variables such as temperature, pressure, and chemical concentration to maintain stable operation.
- Evaluate pulp quality parameters and adjust process conditions accordingly.
- Implement troubleshooting techniques to address common operational issues.
- Demonstrate compliance with environmental and safety regulations in the pulping process.

WHO SHOULD ATTEND

- This course is designed for production operators, process controllers, and technical staff involved in chemical pulping operations, particularly those working with vertical continuous digesters.

COURSE OUTLINE

Day 1: Introduction to Chemical Pulping and Continuous Digesters

- Overview of pulping methods: mechanical, chemical, and semi-chemical
- Principles of kraft pulping: chemistry and reactions
- Introduction to continuous digesters vs batch digesters
- Major sections of a vertical continuous digester: impregnation, cooking, washing
- Safety induction: hazards, lockout/tagout, emergency procedures

Day 2: Wood Yard Operations and Chip Handling

- Wood species selection and debarking
- Chipping process and chip quality standards
- Screening, classifying, and conveying chips
- Chip pile management and reclaim systems
- Moisture content measurement and its impact

Day 3: Cooking Liquor Preparation and Chemistry

- White liquor composition: NaOH, Na₂S, Na₂CO₃
- Liquor preparation: causticizing process overview
- Effective alkali and sulfidity targets
- Liquor heating: indirect vs direct steam injection
- Chemical reactions: delignification, carbohydrate degradation

Day 4: Vertical Continuous Digester Design and Components

- Digester vessel geometry and materials of construction
- Chip feeding: low-pressure and high-pressure feeders
- Liquor distribution and extraction screens
- Heating and circulation systems
- Discharge devices: blow line and cold blow

Day 5: Digester Operation: Start-Up and Shutdown

- Pre-start checks: interlocks, alarms, utilities
- Filling the digester with chips and liquor
- Heating up to operating temperature
- Establishing steady-state conditions
- Shutdown procedures: planned and emergency

Day 6: Process Variables and Control Parameters

- Temperature profiles: cooking zone temperature targets
- Pressure control: top and bottom pressures
- Retention time: chips throughput and level control
- H-factor calculation and application
- Effective alkali charge and residual alkali monitoring

Day 7: Impregnation Zone: Principles and Optimization

- Impregnation temperature and time
- Liquor-to-wood ratio and chip compaction
- Effect of chip size and moisture on penetration
- Air removal and chip steaming

- Troubleshooting poor impregnation

Day 8: Cooking Zone: Reactions and Control

- Delignification phases: bulk, residual
- Kappa number as a measure of lignin content
- Effect of temperature and alkali on kappa number
- Cooking zone temperature control
- Sampling and analysis of cooking liquor

Day 9: Washing Zone: Countercurrent Washing Principles

- Washing zone design: screens and displacement
- Countercurrent flow: wash water and black liquor
- Dilution factor and its effect on washing
- Measuring washing loss (soda loss)
- Troubleshooting washing problems

Day 10: Black Liquor Extraction and Recovery System

- Black liquor composition: organics, inorganics, solids content
- Extraction screens: types and maintenance
- Black liquor flow control and level control
- Introduction to recovery cycle: evaporation, combustion, causticizing
- Impact of extraction rate on pulp quality

Day 11: Pulp Discharge and Blow System

- Cold blow vs hot blow systems
- Blow valve operation and maintenance
- Blow tank: design, level control, and venting
- Blow line safety: pressure relief and isolation
- Handling blow line blockages

Day 12: Quality Control and Pulp Testing

- Sampling methods: liquor and pulp
- Kappa number titration and calculation
- Viscosity measurement for cellulose degradation
- Pulp yield determination
- Quality control charts and process capability

Day 13: Troubleshooting Common Digester Problems

- Chip level fluctuations and hanging
- Screen plugging and liquor flow imbalance
- Temperature and pressure excursions
- High kappa number or low yield
- Black liquor carryover and soda loss

Day 14: Process Optimization and Energy Efficiency

- Steam consumption: heating zone efficiency
- Heat recovery from blow line and flash steam
- Optimizing liquor-to-wood ratio
- Reducing alkali charge with chip quality management
- Benchmarking and key performance indicators (KPIs)

Day 15: Automation and Control Systems

- Distributed Control System (DCS) overview
- Control loops: cascade, feedforward, ratio
- Advanced process control (APC) for digester
- Alarm management and operator response
- Safety instrumented systems (SIS)

Day 16: Maintenance and Inspection of Digester Systems

- Corrosion types: caustic cracking, stress corrosion
- Wear parts: feeder, screens, blow valve
- Non-destructive testing (NDT): ultrasonic, radiography
- Maintenance planning and work order systems
- Spare parts management

Day 17: Environmental Compliance and Safety

- Air emissions: TRS, SO₂, particulates
- Effluent management: BOD, COD, AOX
- Odor control and non-condensable gas (NCG) collection
- Safety: confined space entry, hot work permits
- Emergency shutdown drills and evacuation

Day 18: Advanced Topics: High Kappa and Dissolving Pulp

- High kappa kraft pulping for linerboard
- Pre-hydrolysis kraft process for dissolving pulp
- Modified cooking: extended delignification (EMCC)
- Polysulfide and anthraquinone additions
- Comparison with sulfite pulping

Day 19: Case Studies and Industry Best Practices

- Case study 1: Chip hang-up and production loss
- Case study 2: High soda loss in black liquor
- Case study 3: Kappa number variability
- Best practices in digester operation
- Developing a continuous improvement plan

Day 20: Course Review and Assessment

- Comprehensive review of key concepts
- Written test covering theory and calculations
- Practical assessment: start-up simulation
- Feedback session and Q&A;
- Issuance of certificates of competence

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 **34 NQF credits** at **NQF Level 4**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 89,600.00	R 89,600.00
1	In-House	R 116,500.00	R 116,500.00
1	On-Campus (Pretoria)	R 134,400.00	R 134,400.00

UPCOMING SESSIONS

Start	End	Method	Venue
31 Jul 2026	11 Sep 2026	On-Campus	Cape Town, South Africa
31 Jul 2026	11 Sep 2026	On-Campus	Accra, Ghana
03 Aug 2026	14 Sep 2026	On-Campus	Pretoria, South Africa
03 Aug 2026	14 Sep 2026	On-Campus	Lagos, Nigeria
04 Aug 2026	15 Sep 2026	On-Campus	Johannesburg, South Africa
05 Aug 2026	16 Sep 2026	On-Campus	Mauritius
06 Aug 2026	17 Sep 2026	On-Campus	Cape Town, South Africa
07 Aug 2026	18 Sep 2026	On-Campus	Dubai, 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 114252) 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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