



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

Glass Furnace Operation Continuous Production Training

Manufacturing, Engineering and Technology / Manufacturing and Assembly

Unit Standard 110291 · NQF Level 3 · 50 Credits · 47 Days

COURSE OVERVIEW

This course equips learners with the knowledge and skills required to operate a continuous glass furnace safely and efficiently. It covers furnace startup, monitoring, control, and shutdown procedures, ensuring compliance with industry standards and safety regulations. Participants will gain practical expertise in maintaining consistent glass quality and optimizing furnace performance.

Category	Manufacturing, Engineering and Technology
Subfield	Manufacturing and Assembly
Unit Standard	110291
Accreditation	SAQA Accredited · NQF Level 3 · 50 Credits
Duration	47 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply furnace startup, operation, and shutdown procedures in a continuous production environment.
- Monitor and control furnace parameters such as temperature, pressure, and glass level to maintain consistent quality.
- Analyze furnace data to identify deviations and implement corrective actions.
- Evaluate safety protocols and emergency procedures to prevent accidents and equipment damage.
- Demonstrate proper use of personal protective equipment and adherence to health and safety regulations.
- Implement routine maintenance checks and report operational issues to supervisors.

WHO SHOULD ATTEND

- This course is designed for furnace operators, shift supervisors, and process technicians working in glass manufacturing plants.
- It is also suitable for maintenance personnel seeking to understand furnace operations for better troubleshooting.

COURSE OUTLINE

Day 1: Introduction to Glass Furnace Operations

- Course overview and assessment criteria
- Glass manufacturing process overview
- Types of glass furnaces: regenerative, recuperative, electric
- Fundamentals of heat transfer in furnaces
- Introduction to refractory materials
- Safety induction: hazards, PPE, emergency procedures
- Workplace communication and teamwork

Day 2: Raw Materials and Batch Preparation

- Silica sand, soda ash, limestone, and other additives
- Batch calculation and recipe management
- Moisture content and its effects
- Batch mixing and homogenization
- Conveying and storage systems
- Sampling and testing raw materials

Day 3: Furnace Design and Components

- Furnace layout: melting zone, refining zone, working end
- Crown, sidewalls, bottom, and throat design
- Burner systems: side-fired, end-fired, oxy-fuel
- Heat recovery systems: regenerators vs recuperators
- Refractory selection and installation basics
- Inspection of furnace components

Day 4: Combustion and Heat Transfer

- Combustion chemistry: stoichiometry and excess air
- Fuel types: natural gas, oil, electricity
- Burner operation and flame characteristics
- Heat transfer in the glass melt
- Temperature profiles and gradients
- Energy efficiency considerations

Day 5: Batch Melting Process

- Melting reactions: decomposition, silicate formation
- Batch blanket behavior and control
- Fining and refining: bubble removal
- Homogenization and redox control
- Melting rate and pull rate relationship
- Troubleshooting slow melting

Day 6: Glass Quality and Defects

- Defect types: seeds, blisters, stones, cords, knots
- Sources of defects: refractory, batch, combustion
- In-line inspection techniques: cameras, sensors
- Laboratory analysis: microscopy, XRF

- Quality standards: SAQA, ISO
- Root cause analysis and problem-solving

Day 7: Temperature Control and Instrumentation

- Thermocouples, optical pyrometers, and radiation thermometers
- Temperature profiling along the furnace
- Control loops: PID controllers
- Crown, glass, and bottom temperature management
- Alarm systems and response protocols
- Data logging and analysis

Day 8: Glass Level and Pressure Control

- Glass level sensors: laser, radar, contact
- Level control valves and actuators
- Furnace pressure measurement: draft gauges
- Pressure control dampers
- Interaction between level, pressure, and pull rate
- Common faults and corrective actions

Day 9: Refractory Maintenance and Monitoring

- Refractory corrosion, erosion, and spalling
- Hot spot detection: infrared scanning
- Thickness measurement: ultrasonic, laser
- Repair methods: gunning, casting, patching
- Maintenance planning and record keeping
- Safety during refractory work

Day 10: Energy Management and Efficiency

- Energy balance: input vs output
- Specific energy consumption (SEC)
- Heat losses: through walls, openings, flue gas
- Oxy-fuel vs air-fuel efficiency
- Waste heat recovery systems
- Energy management systems and audits

Day 11: Furnace Start-up and Shutdown Procedures

- Pre-start-up checklist: refractory condition, instrumentation
- Heating curves: drying, sintering, stabilization
- Batch charging initiation
- Normal shutdown: cooling rates, glass drain
- Emergency shutdown: power failure, equipment failure
- Restart after shutdown

Day 12: Forehearth and Conditioning

- Forehearth zones: cooling, homogenizing, equalizing
- Stirring and mixing devices
- Temperature control and profiling
- Glass flow control: gates, tweels
- Impact on gob weight and forming

- Troubleshooting temperature variations

Day 13: Forming Process Interface

- Glass delivery system: channels, spouts, orifices
- Gob formation and shearing
- Forming methods: blow, press, float
- Viscosity requirements for forming
- Communication between furnace and forming teams
- Quality feedback loop

Day 14: Advanced Control Systems and Automation

- Distributed Control Systems (DCS) overview
- Programmable Logic Controllers (PLC)
- Human-Machine Interface (HMI) navigation
- Cascade control: temperature and fuel
- Feedforward control for pull rate changes
- Alarm management and system diagnostics

Day 15: Emissions and Environmental Compliance

- Pollutants: NOx, SOx, particulates, CO2
- Emission limits and permit conditions
- Control technologies: SCR, ESP, baghouse
- Continuous emission monitoring systems (CEMS)
- Stack testing and data reporting
- Environmental management plans

Day 16: Safety and Risk Management

- Hazard identification: thermal, chemical, mechanical
- Risk assessment methods: JSA, HAZOP
- Emergency response plans: evacuation, first aid
- Fire prevention and firefighting equipment
- Gas safety: LEL monitors, isolation
- Incident investigation and reporting

Day 17: Maintenance Planning and Troubleshooting

- Preventive maintenance: daily, weekly, monthly tasks
- Predictive maintenance: vibration analysis, thermography
- Troubleshooting methodology: fishbone, 5 Whys
- Common issues: refractory wear, burner problems, blockages
- Shutdown planning: scope, resources, timeline
- Maintenance records and CMMS

Day 18: Production Planning and Optimization

- Production scheduling: campaign planning
- Pull rate optimization: balancing quality and output
- Product changeovers: color changes, glass composition
- Data analysis: trends, KPIs, OEE
- Continuous improvement techniques: Lean, Six Sigma
- Cost management: fuel, refractory, raw materials

Day 19: Team Leadership and Communication

- Shift handover protocols: SBAR
- Effective communication: verbal, written, electronic
- Coaching and on-the-job training techniques
- Conflict resolution and problem-solving
- Performance monitoring and feedback
- Building a safety-first culture

Day 20: Course Review and Assessment

- Review of key concepts: melting, combustion, control
- Case studies: real-world scenarios
- Written and practical assessments
- Feedback session and course evaluation
- Certification requirements and next steps
- Action plan for continuous learning

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 **50 NQF credits** at **NQF Level 3**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 130,600.00	R 130,600.00
1	In-House	R 169,800.00	R 169,800.00
1	On-Campus (Pretoria)	R 195,900.00	R 195,900.00

UPCOMING SESSIONS

Start	End	Method	Venue
31 Jul 2026	05 Oct 2026	On-Campus	Lagos, Nigeria
03 Aug 2026	06 Oct 2026	On-Campus	Mauritius
04 Aug 2026	07 Oct 2026	On-Campus	Cape Town, South Africa
05 Aug 2026	08 Oct 2026	On-Campus	Dubai, UAE
06 Aug 2026	09 Oct 2026	On-Campus	Pretoria, South Africa
06 Aug 2026	09 Oct 2026	On-Campus	Lagos, Nigeria
07 Aug 2026	12 Oct 2026	On-Campus	Johannesburg, South Africa
10 Aug 2026	13 Oct 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 110291) 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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