



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

Bolts Screws Welds Mechanical Properties Structural Steelwork Connections Training

Physical Planning and Construction / Civil Engineering Construction

Unit Standard 114197 · NQF Level 5 · 8 Credits · 5 Days

COURSE OVERVIEW

This course equips participants with the knowledge and skills to understand and apply mechanical properties of bolts, screws, and welds in structural steelwork connections. It covers the selection, inspection, and installation of these fasteners to ensure safe and reliable structural integrity in accordance with South African standards.

Category	Physical Planning and Construction
Subfield	Civil Engineering Construction
Unit Standard	114197
Accreditation	SAQA Accredited · NQF Level 5 · 8 Credits
Duration	5 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply the mechanical properties of bolts, screws, and welds to select appropriate fasteners for structural steel connections.
- Analyze the load-bearing capacity and failure modes of bolted, screwed, and welded connections.
- Evaluate the quality of welded and bolted connections using relevant inspection criteria and standards.
- Implement correct installation procedures for bolts, screws, and welds to ensure structural integrity.
- Demonstrate understanding of the effects of heat treatment, surface finish, and corrosion on fastener performance.
- Design simple structural steel connections using standard bolted, screwed, or welded configurations.

WHO SHOULD ATTEND

- This course is designed for engineers, technicians, and construction supervisors involved in the design, fabrication, or inspection of structural steelwork connections.
- It is also suitable for quality assurance personnel and tradespeople seeking to deepen their understanding of fasteners and welding in steel structures.

COURSE OUTLINE

Day 1: Introduction to Structural Steelwork Connections and Fasteners

- Overview of structural steelwork connections
- Types of bolts: grade, size, and application
- Types of screws: self-tapping, structural, and machine
- Introduction to welding processes: arc, MIG, TIG
- Mechanical properties: yield strength, tensile strength, ductility
- Connection terminology: gusset, bracket, splice
- Symbols and notation in structural drawings
- Safety considerations in connection design

Day 2: Bolted Connections – Design, Installation, and Inspection

- Bolt grades: 4.6, 8.8, 10.9, and their properties
- Preloading and torque control: turn-of-nut, direct tension
- Design for shear: bearing-type and slip-critical connections
- Design for tension: prying action and bolt groups
- Installation procedures: cleaning, alignment, tightening
- Inspection techniques: torque wrench, tension gauge
- Common defects: loose bolts, corrosion, misalignment
- Standards: SANS 1700, EN 1090

Day 3: Welded Connections – Processes, Design, and Quality

- Welding processes: shielded metal arc (SMAW), gas metal arc (GMAW), flux-cored (FCAW)
- Weld types: fillet, butt, plug, slot
- Weld design: throat thickness, effective length
- Weld symbols per AWS/ISO standards
- Welding procedures: preheat, interpass temperature
- Quality control: visual inspection, non-destructive testing (NDT)
- Common defects: porosity, cracks, lack of fusion
- Welding codes: SANS 10163, AWS D1.1

Day 4: Mechanical Properties and Testing of Connections

- Stress-strain behaviour of steel
- Load paths and stress distribution in connections
- Capacity calculations: bolt shear, bolt tension, weld strength
- Failure modes: bolt fracture, weld rupture, plate tearing
- Destructive testing: tensile test, bend test
- Non-destructive testing: ultrasonic, magnetic particle, dye penetrant
- Factor of safety and limit state design
- Case studies: connection failures and lessons learned

Day 5: Integration, Standards, and Practical Application

- Combined connections: bolted-welded joints
- Design examples: beam-to-column, column base plate
- Standards review: SANS 10163, SANS 1700, EN 1993
- Load combinations: dead, live, wind, seismic
- Erection procedures and site safety

- Documentation: inspection checklists, test certificates
- Workshop: design a connection for a given load case
- Review and assessment

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 **8 NQF credits** at **NQF Level 5**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 17,700.00	R 17,700.00
1	In-House	R 23,100.00	R 23,100.00
1	On-Campus (Pretoria)	R 26,700.00	R 26,700.00

UPCOMING SESSIONS

Start	End	Method	Venue
24 Aug 2026	28 Aug 2026	On-Campus	Victoria Falls, Zimbabwe
24 Aug 2026	28 Aug 2026	On-Campus	Bangkok, Thailand
24 Aug 2026	28 Aug 2026	On-Campus	Harare, Zimbabwe
24 Aug 2026	28 Aug 2026	On-Campus	Shenzhen, China
24 Aug 2026	28 Aug 2026	On-Campus	Durban, South Africa
24 Aug 2026	28 Aug 2026	On-Campus	Abu Dhabi, UAE
31 Aug 2026	04 Sep 2026	On-Campus	Shenzhen, China
31 Aug 2026	04 Sep 2026	On-Campus	Harare, Zimbabwe

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 114197) 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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