



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

Structural Steel Connection Design Principles Training

Physical Planning and Construction / Civil Engineering Construction

Unit Standard 114220 · NQF Level 5 · 11 Credits · 8 Days

COURSE OVERVIEW

This course equips learners with the fundamental principles of structural steel connection design, focusing on practical application within the South African construction industry. Participants will gain the ability to analyze and design bolted and welded connections in accordance with SANS 10162-1, ensuring structural integrity and compliance with local standards.

Category	Physical Planning and Construction
Subfield	Civil Engineering Construction
Unit Standard	114220
Accreditation	SAQA Accredited · NQF Level 5 · 11 Credits
Duration	8 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply the limit states design philosophy to structural steel connections.
- Analyze bolted connections for shear, tension, and combined loading.
- Design welded connections using fillet and groove welds to meet strength and serviceability requirements.
- Evaluate connection detailing for robustness, constructability, and compliance with SANS 10162-1.
- Implement quality control measures for fabrication and erection of steel connections.
- Demonstrate proficiency in interpreting connection details from structural drawings and specifications.

WHO SHOULD ATTEND

- Civil and structural engineers, technologists, and technicians involved in the design, detailing, or review of steel structures.
- Also suitable for construction project managers and site supervisors seeking a deeper understanding of connection behavior.

COURSE OUTLINE

Day 1: Introduction to Structural Steel and Connection Fundamentals

- Overview of structural steel as a construction material
- Steel sections: I-beams, channels, angles, hollow sections
- Introduction to connection components: bolts, welds, plates
- Load paths and force transfer mechanisms
- Classification of connections by stiffness and strength
- Introduction to SANS 10162 and SANS 10163
- Safety considerations in connection design
- Common connection failures and lessons learned

Day 2: Bolted Connections – Design and Detailing

- Bolt types, grades, and material properties
- Shear capacity of bolts: single and double shear
- Tension capacity and prying action
- Combined shear and tension in bolts
- Bearing resistance in plates and members
- Slip-critical connections and preloading
- Minimum and maximum spacing, edge distances
- Detailing rules for bolted connections

Day 3: Welded Connections – Design and Detailing

- Weld types: fillet, groove, plug, slot
- Weld symbols and notation on drawings
- Fillet weld design: throat thickness, effective length
- Groove weld design: complete and partial penetration
- Weld metal strength and matching electrodes
- Welding processes: SMAW, GMAW, FCAW
- Weld defects and non-destructive testing (NDT)
- Detailing for weld access and quality

Day 4: Connection Configuration and Member End Connections

- Shear connections: single and double angle cleats
- Fin plate and flexible end plate connections
- Moment connections: extended end plates, haunches
- T-stub connection design for tension
- Eccentrically loaded bolt groups
- Prying action and stiffener requirements
- Beam-to-column and beam-to-beam details
- Connection ductility and rotation capacity

Day 5: Base Plate and Column Splice Design

- Base plate types: pinned and fixed
- Base plate design for concentric axial load
- Base plate design for combined axial and moment
- Anchor bolt design: tension, shear, and pullout
- Grouting and levelling procedures

- Column splice types: bearing and non-bearing
- Splice design for axial compression and tension
- Erection tolerances and alignment

Day 6: Bracing and Truss Connections

- Types of bracing: X, V, inverted V, K
- Gusset plate design: Whitmore section, block shear
- Truss joint design: welded and bolted
- Eccentricity and secondary moments
- Slenderness of bracing members
- Seismic design considerations for connections
- Wind load effects on bracing connections
- Fatigue design for cyclic loading

Day 7: Connection Design for Tubular and Hollow Sections

- Hollow section properties and grades
- Welded joints: T-, Y-, X-, K-connections
- Chord face failure, punching shear, and local buckling
- Stiffening with internal plates and rings
- Bolted connections for hollow sections
- CIDECT design recommendations
- IIW static design procedure
- Vierendeel truss connections

Day 8: Integration, Quality Assurance, and Practical Application

- Connection design workflow from analysis to detailing
- Quality assurance: material certification, weld procedures
- Inspection: visual, ultrasonic, magnetic particle
- Connection design software: overview and limitations
- Case studies: connection failures and remediation
- Design documentation: calculations, sketches, schedules
- Revision and approval processes
- Course 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 **11 NQF credits** at **NQF Level 5**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 32,200.00	R 32,200.00
1	In-House	R 41,900.00	R 41,900.00
1	On-Campus (Pretoria)	R 48,300.00	R 48,300.00

UPCOMING SESSIONS

Start	End	Method	Venue
03 Aug 2026	12 Aug 2026	On-Campus	Johannesburg, South Africa
04 Aug 2026	13 Aug 2026	On-Campus	Mauritius
05 Aug 2026	14 Aug 2026	On-Campus	Cape Town, South Africa
06 Aug 2026	17 Aug 2026	On-Campus	Dubai, UAE
07 Aug 2026	18 Aug 2026	On-Campus	Pretoria, South Africa
07 Aug 2026	18 Aug 2026	On-Campus	Lagos, Nigeria
10 Aug 2026	19 Aug 2026	On-Campus	Durban, South Africa
10 Aug 2026	19 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 114220) 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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